IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

WASHINGTON, D.C. 20231

DECLARATION SUPPORTING INTERFERENCE

Re: Application of Darrell G. Meyer
Serial No.: Divisional of 09/890514
Filed : October 12, 2001
Titled: Weight Bearing Systems And Methods Relating To Same

I, the undersigned, Darrell G. Meyer, hereby declare as follows:

1. I am the applicant in the concurrently filed divisional application.

2. I have been involved in the construction industry since 1961 and have experience with much weight, bearing systems. I have been a California subcontractor and general contractor. I have designed and constructed many types of buildings, both wood frame and steel frame. I have designed machines, framing tables, roof truss assembly fixtures and framing jigs for the steel frame industry.

3. I invented the subject matter of the claims of said divisional application at least as early as March 27, 1996. which is prior to February 4, 1998, the filing date of the application that matured into U.S. Patent No. 6131362, issued October 17, 2000.

4. As set forth hereinbelow, I was not convinced that my inventive designs would be satisfactory for their intended purpose until about January 1999, shortly after which I filed my own patent application. During that entire intervening period I was building prototypes, testing the prototypes, and improving the design. Adequate testing was thought to be especially critical in this field for safety

reasons. Errors in estimating load strength could result in significant loss of property, and even loss of life.

Rectangular Channel Design

5. In early 1995 I began focusing on problems relating to metal floor joists (trusses). In particular, I wanted to invent a metal floor joist that would reduce the failure rate and squeaks associated with screw construction. My original idea was to provide a metal floor joist made from three separate sheets of steel, having two channels connected by a web, and held together by welds as opposed to screws. At that time I thought the channels would be "U" shaped or rectangular.

6. On or about March 25, 1995 I prepared a drawing of my conception, a true and correct copy of which is appended hereto as Exhibit 1.

7. In October 1995 I contacted D. Kingston Cable about a possible joint development project for a metal floor joist having "U" shaped or rectangular channels.

8. On October 27, 1995 I prepared and sent a draft non-disclosure/non-competition agreement to Allan MacQuiod, CEO of D. Kingston Cable, regarding a possible U shaped channel design. At this stage I was referring to my company as Trussteel. A true and correct copy of the draft agreement is appended hereto as Exhibit 2.

9. On or about November 6, 1995 I prepared a cash flow projection for Kingston Cable, and sent the same to D. Kingston Cable with drawings. A true and correct copy of the cash flow projection and drawings is appended hereto as Exhibit 3.

10. On or about December 12, 1995, I prepared additional drawings related to the rectangular channel floor joists, a true and correct copy of which is appended hereto as Exhibit 4.

11. On or about December 13, 1995, I prepared additional drawings related to the rectangular channel floor joists, and faxed same to "Saeed" and "Wei", employees at the consulting firm of Gouvis Engineering, in Newport Beach, CA ("Gouvis Engineering "). (See Exhibit A). A true and correct copy of the fax is appended hereto as Exhibit 5.

12. On or about December 20, 1995, I negotiated a joint development agreement with persons at Gouvis Engineering, related to my floor joists. Under the agreement Gouvis Engineering was to provide engineering calculations on the properties of my joist designs. A true and correct copy of the executed agreement (with appended drawings) is appended hereto as Exhibit 6.

13. On or about December 27, 1995, I prepared and sent an additional drawing related to the rectangular channel floor joists, and sent same to persons at Wei at Gouvis Engineering. A true and correct copy of the additional drawing is appended hereto as Exhibit 7.

14. During January or February 1996, I contacted Don Moody, an employee at Western Metal Lath & Steel Framing Systems, Riverside, CA ("Western Metal") about a possible joint development agreement for the rectangular channel floor joists. Mr. Moody responded that he wanted to see cost estimates and information on competitive products.

15. On or about February 14, 1996 I prepared a costs estimate for the rectangular channel floor joists, and met with Mr. Moody to discuss same. A true and correct copy of the costs estimate is appended hereto as Exhibit 8.

16. On or about February 16, 1996 I sent a letter to Mr. Moody confirming our meeting, and offering to provide Mr. Moody with results of the Gouvis Engineering. A true and correct copy of the letter is appended hereto as Exhibit 9.

17. Shortly after February 16, 1996 I received from Mr. Moody a letter confirming the interest of Western Metal in the rectangular channel floor joists. A true and correct copy of the costs estimate is appended hereto as Exhibit 10.

18. On or about February 22, 1996 I searched for competitive information on metal joists, and prepared notes documenting that search. A true and correct copy of my notes is appended hereto as Exhibit 11.

19. On or about February 29, 1996 I received a fax from Gouvis Engineering that contained preliminary engineering strength projections for several of my designs. A true and correct copy of the fax is appended hereto as Exhibit 12.

20. On or about March 8, 1996, I made preliminary calculations of strengths of additional designs. A true and correct copy of my calculations is appended hereto as Exhibit 13.

21. On or about March 12, 1996 I received another fax from Gouvis Engineering, which contained additional engineering strength projections for several of my designs. A true and correct copy of the fax is appended hereto as Exhibit 14.

22. On or about March 26, 1996 I developed a plan for a company that would develop my metal joist designs. A true and correct copy of the plan is appended hereto as Exhibit 15.

Five-Sided Channel Design

23. On or about March 27, 1996 I conceived of a new metal joist idea that would include five-sided channels, as claimed in the concurrently filed application. A true and correct copy of a drawing of the new idea is appended hereto as Exhibit 16.

24. On or about March 29, 1996 I sent to Gouvis Engineering a copy of drawings containing the new idea with five-sided channels. A true and correct copy of the drawing with notes is appended hereto as Exhibit 17.

25. As of late March 1996 I thought the new idea for five-sided channels would likely worth patenting if: (a) I could adequately build and test a prototype; (b) the prototype would show sufficient strength; and (c) I could figure out a design that could be produced commercially at a satisfactory cost. In the absence of testing, however, I was not at all sure that the contemplated device would work sufficiently for its intended purpose.

26. On or about March 23, 1996 I informed Mr. Don Moody about the new idea with five-sided channels. On or about April 3, 1996 I prepared a draft Letter of Intent between myself and Mr. Moody for joint testing and possible licensing. A true and correct copy of the draft with notes is appended hereto as Exhibit 18.

27. Shortly after April 23, 1996 I received a letter from Mr. Don Moody confirming that Western Metal was interested in mutually developing and marketing a floor joist, provided a product could be satisfactorily developed and tested. A true and correct copy of the draft with notes is appended hereto as Exhibit 19.

First Prototype and Testing

28. In May 1996 I contacted Lane and Roderick, Inc., to construct an early prototype of a floor joist having five-sided channels. Shortly after May 14, 1996 I received a quote for same from Lane & Roderick, a true and correct copy of which is appended hereto as Exhibit 20.

29. On or about June 3, 1996 the first three prototype joists (trusses) were completed by Lane Roderick and shipped to me. A true and correct copy of the packing slip

is appended hereto as Exhibit 21. The prototype joists were resistance spot welded at Janco Engineering, Corona, California.

30. On or about June 6, 1996, Western Metal wrote a check that paid for the Lane & Roderick services. A true and correct copy of the check is appended hereto as Exhibit 22.

31. Shortly after June 14, 1996, I received a letter from R. F. Tucker, confirming that Radco Certification of Long Beach, California, would test the early prototypes. A true and correct copy of the letter is appended hereto as Exhibit 23.

32. On or about June 18, 1996, I sent a letter to Mr. Don Moody at Western Metal confirming arrangements for conducting the preliminary test. A true and correct copy of the letter is appended hereto as Exhibit 24.

33. On or about July 3, 1996, the first set of preliminary tests was performed by Radco Certification. The set up consisted of 3-20 foot parallel joists covered with plywood and loaded progressively with lead weight to determine deflection and ultimate failure. Failure occurred at single layer of center section at transition from pentagonal chord to folded flanges on diagonal web. Testing was observed by Mr. Don Moody, Mr. Nick Gouvis, Radco staff, and myself. A true and correct copy of the preliminary test results is appended hereto as Exhibit 25. A true and correct copy of a photograph taken during the testing process, and including Mr. Don Moody and Mr. Nick Gouvis, is appended hereto as Exhibit 25.

34. Gouvis Engineering reviewed the preliminary test results, and later in July 1996 Gouvis Engineering provided me with handwritten analysis of the preliminary test results performed earlier in the month. A true and correct copy of the handwritten analysis is appended hereto as Exhibit 26.

Product Not Deemed Satisfactory For Its Intended Purpose

35. In July 1996, my reading of the preliminary results and analysis was that the basic idea of floor joists with five-sided channels could be made satisfactory, but only if I could figure out a design that (a) would strengthen the web between the channels, and (b) could be produced commercially at a satisfactory cost. Among other things, I contemplated that a spot welded design would be too slow to be commercially feasible. I therefore set about reworking my design so that it could be produced on a line operating at a speed of at least 60 lineal feet per minute.

36. In late July 1996, I contacted National Machine Exchange, Inc. to determine whether I could adapt some used equipment to provide a make-shift production line.

37. On or about August 6, 1996, I received a quotation for used equipment that might possibly work for the make-shift production line. A true and correct copy of the quotation is appended hereto as Exhibit 27.

38. On or about August 19, 1996, I received a quotation from AL Engineering, Inc, in Santa Ana, CA for other equipment that might possibly work for the make-shift production line. By that stage I had revised the design to include multiple elongated punch outs in the web between adjacent large triangular punch outs. This design change was thought to strengthen the web, but without additional testing I could not be sure. A true and correct copy of the quotation is appended hereto as Exhibit 28.

39. During the period from August 1996 through December 1997, I developed numerous different designs for floor joists with five-sided channels. An example is depicted in the drawing dated August 1, 1997, having a three screw pattern. However, none of my designs during that period were deemed satisfactory to me for their intended purpose, because I hadn't yet established that they could be

produced on a line operating at a speed of at least 60 lineal feet per minute. A true and correct copy of the quotation is appended hereto as Exhibit 29.

Discussions With Roll-Form Manufacturers

40. During the Fall of 1997 I concluded that the desired production line speed of 60 lineal feet per minute could not realistically be achieved with resistance sport welding. I therefore began consulting with various roll-form manufacturers.

41. On or about January 7, 1998 I received quotations from a used equipment dealer, National Machinery Exchange, Inc., of Pico Rivera, CA. True and correct copies of the quotations are attached hereto as Exhibit 30.

42. On or about January 8, 1998 I received a proposal from a roll form manufacturer, American Machine & Rollform Tech, Inc. in Salem, OR. A true and correct copy of the letter is attached hereto as Exhibit 31.

43. On or about March 25, 1998, I sent a letter to American Machine & Roll Form inquiring about continuous roll form manufacturing equipment. By this point I has changed the name of my company from Trussteel to SteelWerks. A true and correct copy of the letter is appended hereto as Exhibit 32.

44. On or about April 6, 1998, I sent a letter to The Bradbury Company inquiring about continuous roll form manufacturing equipment. A true and correct copy of that letter is appended hereto as Exhibit 33.

45. Also on or about April 6, 1998, I sent a letter to Eckold A G in Schweiz, Switzerland, inquiring about clinch fastening equipment. A true and correct copy of that letter is appended hereto as Exhibit 34.

46. Shortly after April 17, 1998, I received a quotation from Sim-Vision, regarding machinery that could possibly be used to continuously weld devices incorporating

my then-current five-sided channel joist design. A true and correct copy of the letter is appended hereto as Exhibit 35.

47. On or about June 4, 1998, I conceived of a revised five-sided channel joist having clinches that could be introduced by a continuous roll machine. I sent drawings to Dan Lovelace at American Machine regarding the new idea. A true and correct copy of the drawings is appended hereto as Exhibit 36.

48. Shortly after July 13, 1998, I received quotations from National Machinery Exchange, Inc, Pico Rivera, CA, regarding machinery that could possibly be used to produce the revised five-sided channel joist design. True and correct copies of the quotations are appended hereto as Exhibit 37.

49. On or about July 20 1998, I prepared a drawing depicting how a continuous roll machine could produce the revised five-sided channel joist design. A true and correct copy of the drawing is appended hereto as Exhibit 38.

50. Shortly after July 29, 1998, I received quotations from Sterling Machinery Exchange, South El Monte, CA, regarding additional machinery that could possibly be used to produce the revised five-sided channel joist design. True and correct copies of the quotations are appended hereto as Exhibit 39. True and correct copies of photographs of the contemplated Sterling machinery are appended hereto as Exhibit 39.

51. During the Fall of 1998 I discussed with Mr. Don Moody and several other individuals my design to be manufactured using a continuous roll machine.

Product Deemed Satisfactory For Its Intended Purpose

52. In late January 1999 I finally concluded that my design manufactured using a continuous roll machine would very likely work sufficiently for its intended

purpose, and that additional development would only be needed to optimize the design. I therefore contacted my patent attorney in early February to file a patent application. (see below).

53. I also set out to build and test prototypes of the design deemed to be sufficient for its intended purpose. USS/POSCO agreed to participate in the testing.

54. During March 1999 I designed and ordered fabrication of machine tooling from Master Mechanics in Stanton, California. The tooling was necessary to form flanges on the pentagonal and slotted openings in the web section of the joist design. That tooling was delivered on or about March 30, 1999.

55. On or about April 8, 1999 eight 20 foot joists were fabricated by Lane and Roderick, 4 each 18 gauge and 4 each 20 gauge. Clinch Fastening of pentagonal channels was utilized.

56. On or about May 15, 1999, I prepared a drawing that depicted proposed tooling for my latest clinching machine, needed to commercialize the (by then) patent pending joist design. A true and correct copy of the drawing is appended hereto as Exhibit 40.

57. In early June 1999 my joist design prototypes were tested at NAHB Research Center, Inc, in Upper Marlboro, Maryland. The report concluded that although the "steel I joist" exceeded C shape by approximately 25% (weight of material per foot), a better connection detail for a rim track should be investigated. A true and correct copy of the test results are appended hereto as Exhibit 41.

58. Following receipt of the June 1999 test results, I designed a new rim band with diamond shaped stiffening ribs and tabs pre-punched at 8 inch spacing to accommodate attachment to joists for placement at 16 inch or 24 inch centers. On or about June 12, 1999 I prepared a drawing of a rim band design that could be

used with the patent pending joist design. A true and correct copy of the drawing is appended hereto as Exhibit 42.

Patent Applications

59. During the summer of 1996, I contemplated filing a patent application on the subject matter of my invention. To that end I searched for prior art at the patent repository at the Los Angeles public library. A true and correct copy of surviving notes from that search are attached hereto as Exhibit 43.

60. During the week of July 25, 1996, I disclosed the basic subject matter of my invention to a patent attorney, Robert D. Fish, and provided Mr. Fish with the originals of my prior art search notes.

61. Mr. Fish conducted an additional search, and told me that the invention appeared to be patentable. He then asked me if I had experimented sufficiently to believe that the invention would work satisfactorily for its intended purpose. I answered that I had not performed such experimentation, and that I was not yet sure that the invention would work satisfactorily for its intended purpose. Based on that information, and my then-current efforts to complete the needed experimentation, Mr. Fish and I agreed to hold off on filing an application until I had determined that invention would work satisfactorily for its intended purpose.

62. As described hereinabove, I spent the next few years completing the needed experimentation.

63. On or about February 2, 1999 I again contacted Mr. Fish, and informed him that I had now completed enough experiments to believe that the invention would work satisfactorily for its intended purpose. I therefore asked Mr. Fish to file a patent application for me.

64. On or about February 5, 1999 Mr. Fish filed a provisional application on my invention, serial number 60/118952.

65. On or about March 31, 1999 Mr. Fish filed a utility application, serial no. 09/282306, claiming priority to the 60/11892 provisional application.

66. On or about February 3, 2000 Mr. Fish filed a PCT application, serial no. PCT/US00/02837, claiming priority to both the 09/282306 and 60/11892 applications.

67. On or about Jaunuary 9, 2001, the USPTO issued utility application 09/282306 as US patent no. 6170217.

68. On or about July 31, 2001 the PCT application entered national phase in the US, as serial number 09/890514.

69. A divisional of U.S. serial number of 09/890514 is now being filed in order to invoke an interference with the US 6131362 patent.

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I hereby declare under the laws of United States of America that all statements made herein of my own knowledge are true and that statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, Section 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Executed at Fullerton, California, May 4, 2007.

By: _____
Darrell G. Meyer

Respectfully submitted,

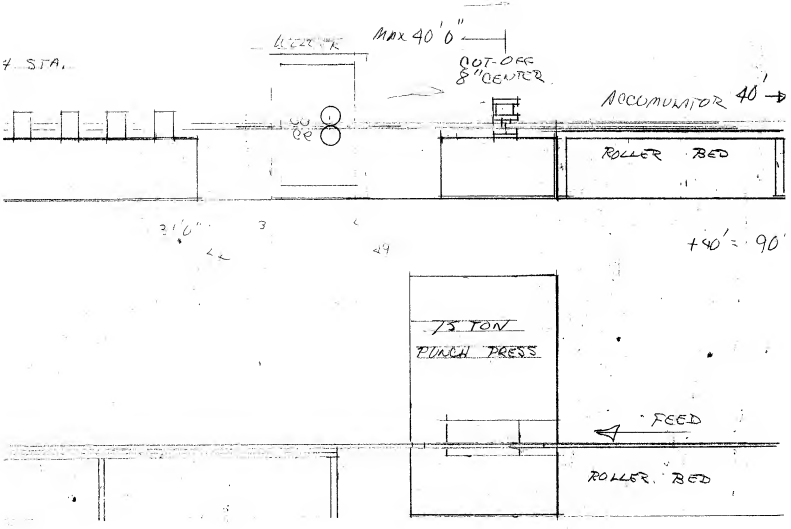
Fish & Associates, LLP

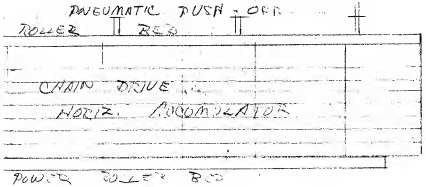
Dated: 5-4-07

By: _____
Robert D. Fish
Reg. No. 33,880

Attorneys for Applicant(s)
1440 N. Harbor Blvd., Suite 706
Fullerton, CA 92835
Tel.: (714) 449-2337
Fax: (714) 449-2339

EXHIBIT 1





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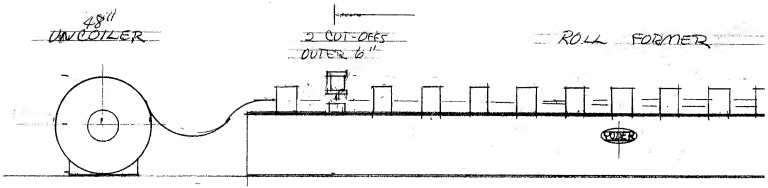
100' x 20' ±


48"
UNCOILER
2 CUT-OFFS
OUTER 6"
ROLL FORMER
OUTER
3'
5'

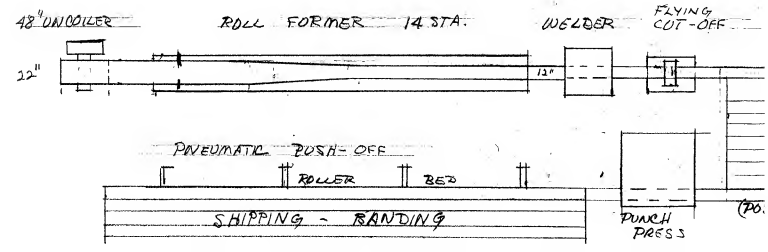

48" UNCOILER
ROLL FORMER 14 STA.
WELDER
FLYING CUT-OFF
22"
12"
PNEUMATIC PUSH-OFF
ROLLER BED
SHIPPING - BANDING
PUNCH PRESS

EXHIBIT 2

October 27, 1995

AGREEMENT

TRUSSTEEL, Darrell G. Meyer
13269 Soft Cloud Way
Victorville, CA 92392

RE: TRUSSTEEL Open Web Steel Floor Truss

The Undersigned hereby acknowledge the proprietary design rights of Darrell G. Meyer, Inventor, of a certain floor truss assembly incorporating resistance electric welding of "U Channnel" vertical and diagonal webs and rectangular tube members. A prototype of which was tested approximately September 20, 1995.

We will not offer for sale, license or manufacture this product or a like type product without the consent and approval of Darrell G. Meyer.

Sincerely,

ANGELES METAL SYSTEMS
4817 E. Sheila Street
Los Angeles, CA 90040

TRUSSTEEL

Allan MacQuoid, C.E.O.

Darrell G. Meyer

D. Kingston Cable, Chairman

EXHIBIT 3

TO D. KINGSTON CA 846

CASH REQUIRED TO PROCEED W TRUSSTECH PROTOTYPE & TESTING/60 DAY NOV 6 95

D.G. MEYER

	TOTAL	DOC NOV	DEC	JAN
DARRELL G. MEYER	13000 -			
RETAINER - GOOD FAITH		6 5000 -		
SALARY - DRAW		4000 -	4000 -	
METALURGY - WELD CONSULT $100 HR X 5	500 -	11 500 -		
WELDER - CONTRACTOR BID $11,800 + TAX	12500 -	6000 -		
		11	12 6500 -	
BRIDGE - GANTRY - FESTOONING BID $2800 TT	3000 -	20 1500 -		
			10 1500 -	
TRUSS ASSY FIXTURE	6000 -			
VERBAL - ANAHEIM WELD		10 3000 -		
			10 3000 -	
ROLLERS — STANDS	2000 -	10 2000 -		
HYTROL - QUOTE				
CHAIN ACCUM. & DOLLIES	4000 -	20		
		2000 -		
			20 2000 -	
INSTALL - LABOR, ELECT, MISC	3000 -			
		20 2000 -		
			20 1000 -	
TOTAL	44000 -			
NOV		26000 -		
DEC			18000 -	

SEE 3 MONTH START-UP FOR ADDITIONAL EXPENSES

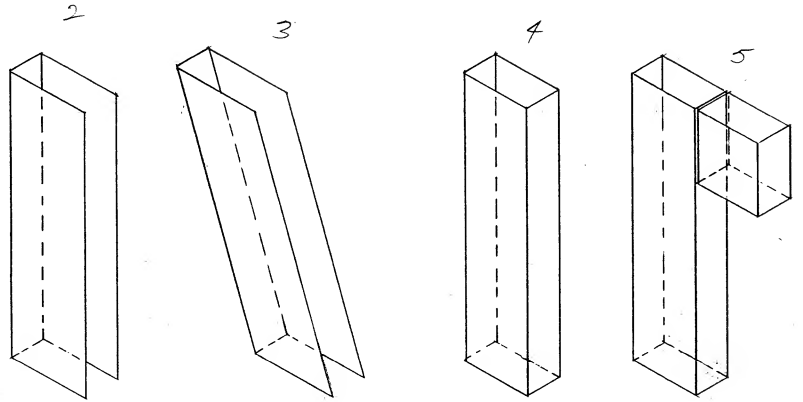
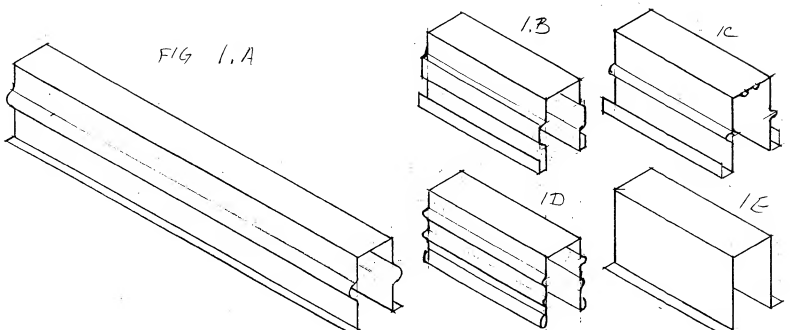
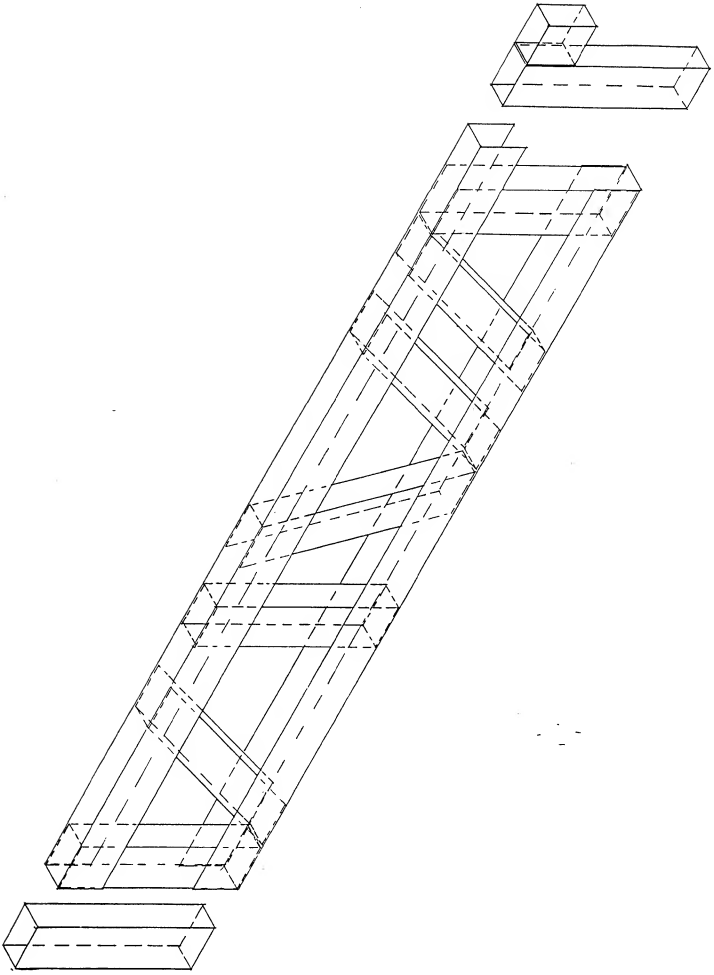


FIG 1.A





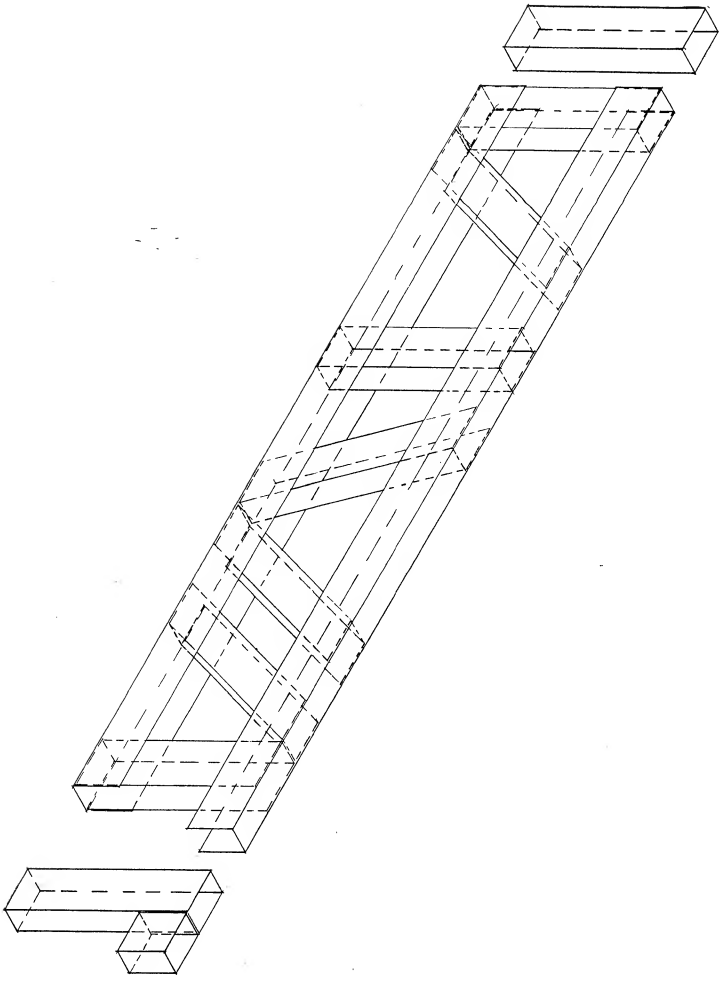
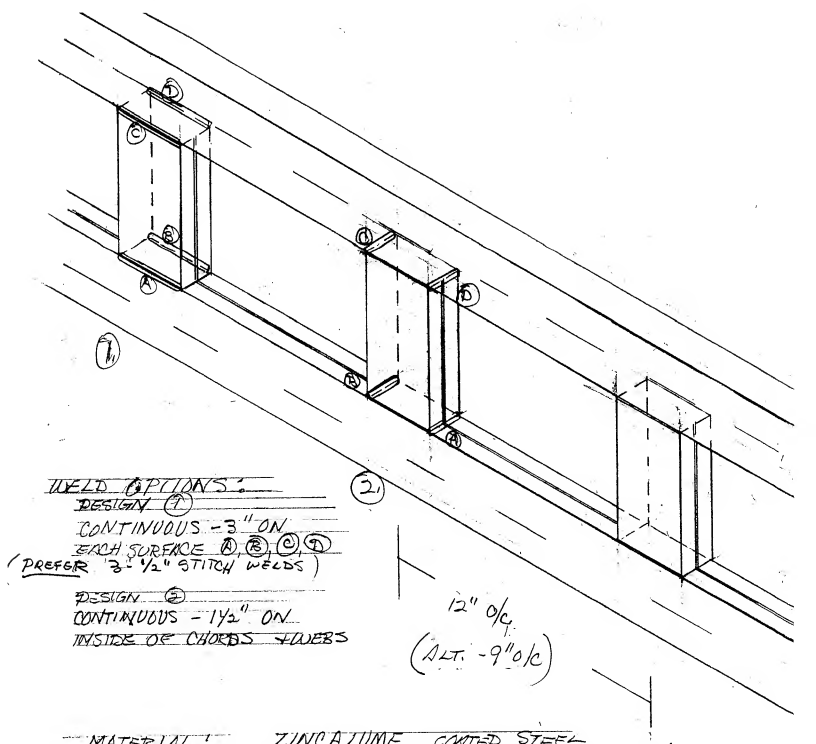


EXHIBIT 4



WELD OPTIONS:

DESIGN (1)

CONTINUOUS - 3" ON EACH SURFACE A, B, C, D

(PREFER 3 - 1½" STITCH WELDS)

DESIGN (2)

CONTINUOUS - 1½" ON INSIDE OF CHORDS + WEBS

MATERIAL: ZINCALUME COATED STEEL

20 GAUGE .0346 (.035) ROLL FORMED TO TUBE SECTION

ALT 18 " .045 (.047)

WEB - SAME MTL AS CHORD

CALCULATIONS FOR

1½" x 3" TUBE

18 GA. & 20 GA.

WEBS @ 12" O/C & 9" O/C

* REVISED 12-12-95 G

DARRELL G. MEYER 11-14-95

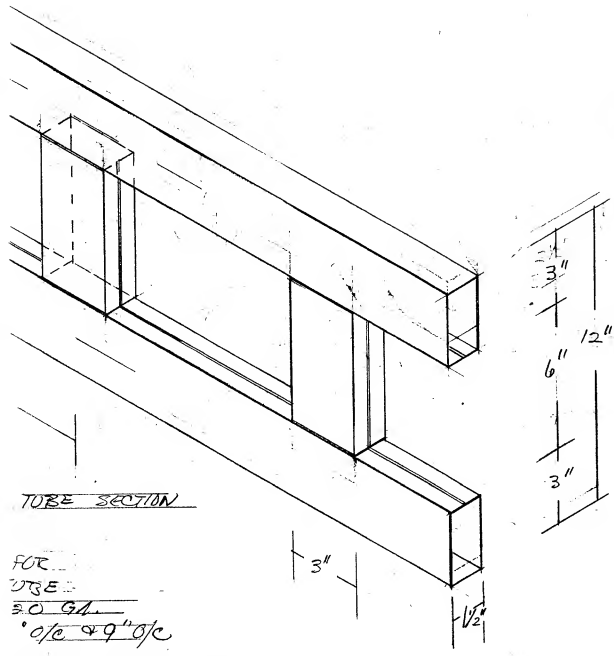
619 988-9736

EXHIBIT 5

FAX 714 752-5321

12-13-95

TO: SAEED AND WEI



TUBE SECTION

FOR
UBE
5.0 GA.
'o/c @ 9" o/c

EVISED 12-12-95

EXHIBIT 6

AGREEMENT FOR PROFESSIONAL SERVICES

THIS AGREEMENT IS ENTERED INTO THIS 20 TH DAY OF DECEMBER, 1995 BY AND BETWEEN DARREL G. MEYER, (AN INDIVIDUAL), HERINAFTER REFERRED TO AS "DGM", AND GOUVIS ENGINEERING (A CALIFORNIA CORPORATION), HERINAFTER REFERRED AS "GE".

WHEREAS DGM HAS INVENTED A LIGHT GAUGE STEEL SECTIONED FLOOR TRUSS SYSTEM HERINAFTER REFERRED TO AS "THE SYSTEM", AND WHEREAS DGM DESIRE TO RETAIN GE FOR THE NECESSARY STRUCTURAL ENGINEERING DESIGN RELATED TO THE INVENTION, AND WHEREAS GE WHICH HAS THE PROFESSIONAL CAPABILITY TO RENDER SAID REQUIRED ENGINEERING DESIGN SERVICES, DGM AND GE HEREBY AGREE TO THE FOLLOWING TERMS AND CONDITIONS FOR SAID PROFESSIONAL SERVICES.

RECITALS

DGM WILL RETAIN ALL PROPRIETARY DESIGN AND PATENT RIGHTS TO THE SYSTEM, AND WILL ASSUME ANY AND ALL LIABILITIES FOR ANY PATENT INFRINGEMENTS, OR ANY CLAIMS MADE BY OTHERS WHO MAY SEEK REMEDY FOR OWNERSHIP RIGHTS OF THE SYSTEM OR ANY PART THEREOF, AND WILL HOLD GE, AND ALL EMPLOYEES OF GE HARMLESS IF ANY CLAIMS ARE MADE AGAINST EITHER DGM AND/OR GE AND AND/OR ANY OF GE's EMPLOYEES INCLUDING BUT NOT LIMITED TO COSTS FOR DEFENSE AS TO LAW SUITS INVOLVING DESIGN AND/OR PATENT RIGHTS OR CLAIMS OF PROPRIETARY OWNERSHIP BROUGHT ABOUT BY OTHERS.

GE WILL MAINTAIN ERRORS AND OMISSIONS INSURANCE COVERAGE FOR ERRORS OR OMISSIONS MADE IN THE DESIGNS BY GE BY EITHER SELF INSURING OR BY MAINTAINING A POLICY OF INSURANCE WITH A COMPANY THAT NORMALLY SELLS COVERAGE FOR SAID DESIGN ERRORS OR OMISSIONS. SAID COVERAGE WILL IN NO CASE BE LESS THAN $250,000.00 AS AN AGGREGATE AMOUNT IN ANY ONE YEAR PERIOD.

GE AND A LIMITED NUMBER OF GE EMPLOYEES IN THE PURSUIT OF THIS AGREEMENT , HAVE KNOWLEDGE OF CERTAIN PATENTABLE IDEAS BROUGHT FORTH BY DGM, AND ALL WILL, ON A BEST EFFORTS BASIS PROTECT THIS SECRET INFORMATION FROM ANY UNRELATED ENTITIES FOR THE BENEFIT OF DGM.

DGM AND GE AGREE THAT THE DEVELOPMENT AND THE FUTURE PROMOTION OF THE SYSTEM WILL REQUIRE AN ON GOING RELATIONSHIP BETWEEN THE PARTIES ABOVE

FIRST MENTIONED AND THAT GE WILL BE COMPENSATED FOR THE NECESSARY PROFESSIONAL DESIGN SERVICES IN THE FOLLOWING MANNER.

GE WILL BE COMPENSATED ON A TIME AND MATERIAL BASIS AT A RATE OF TWICE THE NORMAL THREE TIMES CLOCK. (CLOCK IS HEREIN DEFINED AS THE HOURLY RATE PAID TO AN INDIVIDUAL EMPLOYEE OF GE.) SEE ATTACHED EXHIBIT A WHICH IS THE CURRENT GE HOURLY RATE SCHEDULE FOR THE VARIOUS GE EMPLOYEES. (THE RATES NOTED ARE TYPICALLY MODIFIED UPWARD EACH YEAR TO ACCOMMODATE FOR INFLATION, AND TO AGREE TO THIS DGM HAS INITIALED THIS LINE IN THE RIGHT HAND MARGIN) *INITIAL*
GE WILL BE PAID HALF OF THE THEN CURRENT STATEMENT WHEN DEVELOPMENT FUNDING BECOMES AVAILABLE, AND THE OTHER HALF WILL BE PAID WHEN THE BUSINESS HAS A CASH FLOW SOURCE FROM SALES OF THE DEVELOPED PRODUCTION TO INDUSTRY. ALSO AT THAT TIME , AND AFTER ALL PRIOR BILLING IS PAID IN FULL, GE WILL COMMENCE CHARGING FOR SERVICES AT THE NORMAL THREE TIMES CLOCK.

GE WILL KEEP ACCURATE RECORDS OF TIME AND OUT OF POCKET REIMBURSABLE CHARGES FOR ALL WORK DONE IN THE PURSUIT OF THIS AGREEMENT AND WILL RENDER MONTHLY STATEMENTS TO DGM, OR TO ENTITIES HE MAY CREATE, OR AFFILIATE WITH, IN PROMOTING, SELLING OUTRIGHT, OR OTHERWISE USE OF GE EFFORTS IN THIS MATTER.

GE WILL ON A BEST EFFORTS BASIS ASSIST IN SALES OF THE FINAL MARKETABLE SYSTEM BY OFFERING IT'S USE TO THE SEVERAL DEVELOPERS AND BUILDERS WHO ARE CURRENTLY USING THE PROFESSIONAL SERVICES OF GE. IT IS HEREBY AGREED THAT GE WILL BE PAID A FINDERS FEE COMMISSION FOR ANY AND ALL SUCCESSFUL SALES GE MAY CREATE. SAID FEE WOULD BE EQUAL TO THE STANDARD AMOUNT AS WILL BE DETERMINED BY DGM WHEN ACTUAL SALES BEGIN.

IT IS THE BELIEF OF BOTH DGM AND GE THAT THE SYSTEM, AND IT'S ULTIMATE MARKETABILITY IN THE BUILDING INDUSTRY WILL REQUIRE THE ON GOING SERVICES OF GE, AND AS AN INDUCEMENT FOR GE TO REMAIN WITH THE PROGRAM, DGM DOES HEREBY GRANT TO GE A FIVE PERCENT OWNERSHIP / PARTICIPATION OF STOCK OR INTEREST IN THE ENTERPRISE AS ORGANIZED BY DGM. THIS INCLUDES BUT IS NOT LIMITED TO A FIVE PERCENT OF THE GROSS INTEREST IN THE SALE OF THE SYSTEM TO ANOTHER BUSINESS ENTITY.

DGM WILL PROVIDE INFORMATION TO GE FROM TIME TO TIME WHICH WILL REQUIRE THE PROFESSIONAL DESIGN SERVICES BY GE, AND GE WILL PROVIDE SAID SERVICES IN A TIMELY FASHION AS REQUIRED.

TERMINATION

EITHER PARTY MAY TERMINATE THIS AGREEMENT WITHOUT CAUSE UPON WRITTEN NOTIFICATION THIRTY DAYS PRIOR TO THE DATE OF TERMINATION. ALL WORK PRODUCT BY GE WILL IMMEDIATELY CEASE AND ALL BILLING WILL BECOME DUE AND PAYABLE TO GE WITHIN THIRTY DAYS OF SAID TERMINATION. UPON TERMINATION GE WILL WAIVE THE FIVE PERCENT INTEREST IN THE DGM ENTERPRISE IF TERMINATION OCCURS PRIOR TO THE FINAL DEVELOPMENT OF THE SYSTEM AS DETERMINED BY GE.

ARBITRATION

THE STANDARD ARBITRATION RULE WILL PREVAIL IF THERE IS A DISAGREEMENT BETWEEN THE PARTIES WHO HAVE AFFIXED THEIR SIGNATURES BELOW.

ASSIGNMENT

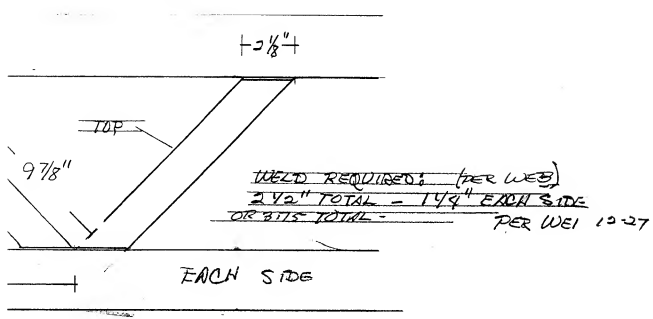
TERMS OF THIS AGREEMENT WILL PREVAIL UPON ALL HEIRS, ASSIGNEES, OR USERS OF ANY NATURE OF THE SYSTEM.

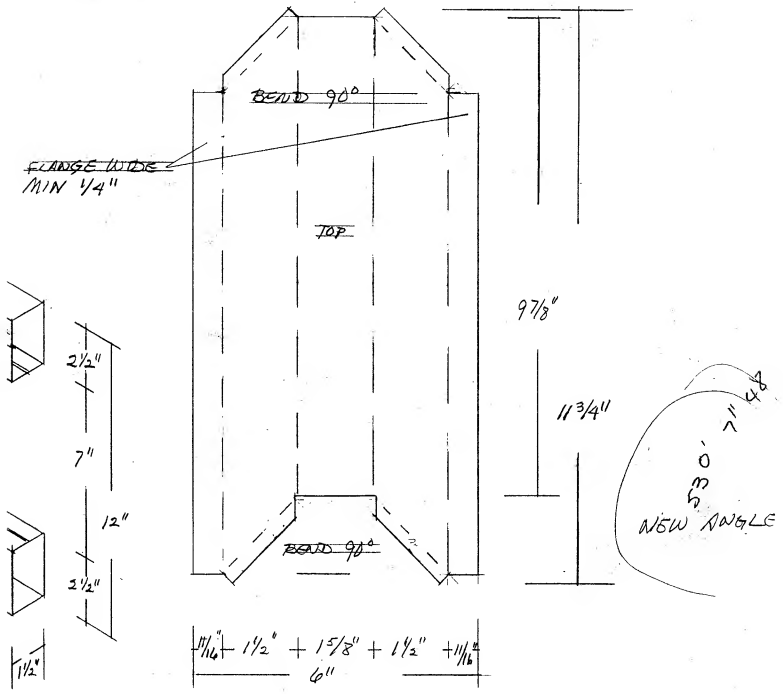
AGREED THIS 20 TH DAY OF DECEMBER, 1995

GOUVIS ENGINEERING

DARRELL G. MEYER
13269 SOFT CLOUD WAY
VICTORVILLE, CA. 92392
(619) 955-9736

SAEED BEKAM, PRESIDENT


2 1/8"
TOP
9 7/8"
WELD REQUIRED: (PER WEB)
2 1/2" TOTAL - 1 1/4" EACH SIDE
OR 3 1/16 TOTAL -
PER WEI 10-27
EACH SIDE


BEND 90°
FLANGE WIDE
MIN 1/4"
TOP
9 7/8"
11 3/4"
2 1/2"
7"
12"
2 1/2"
1 1/2"
BEND 90°
11/16" + 1 1/2" + 1 5/8" + 1 1/2" + 11/16"
6"
7" 48
NEW ANGLE

MATERIAL - ZINCALUME/GALVANIZED
ROLL FORM CHORDS 1 1/2" X 2 1/2"
UPPER: 16'6" CLEAR 20 GA,
20'6" CLEAR 18 GA,
LOWER: ALL 20 GA,
WEBS - 1 1/2" x 1 1/2" STAMP & BRAKE
WELD - MIG 3/4" STITCH OR CONTINUOUS

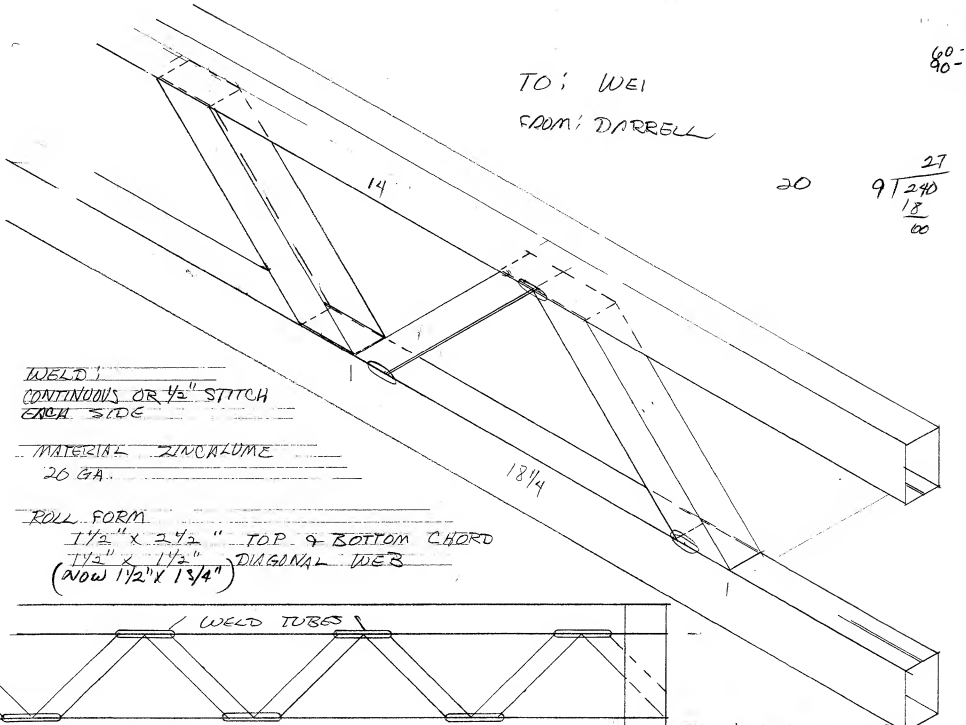
60 - 3000
80 - 4000

TO: WEI

FROM: DARRELL

20

$9\overline{)240}$ = 27, $\frac{18}{60}$



WELD:
CONTINUOUS OR ½" STITCH
EACH SIDE

MATERIAL ZINCALUME
26 GA.

ROLL FORM
1½" x 2½" TOP & BOTTOM CHORD
1½" x 1½" DIAGONAL WEB
(NOW 1½" x 1¾")

FOR VERTICAL TRANSFER
FIELD INSTALL 3½" x 1½" TRACK

@ $3 PER FT

TRUSSSTEEL JOIST / HEADER
ALL PROPRIETARY RIGHTS RESERVED
DARRELL G. MEYER 1-10-96

2'0" x 2'0" 18 GA. SHEET
BOTH SIDES
SCREW _____, #_____

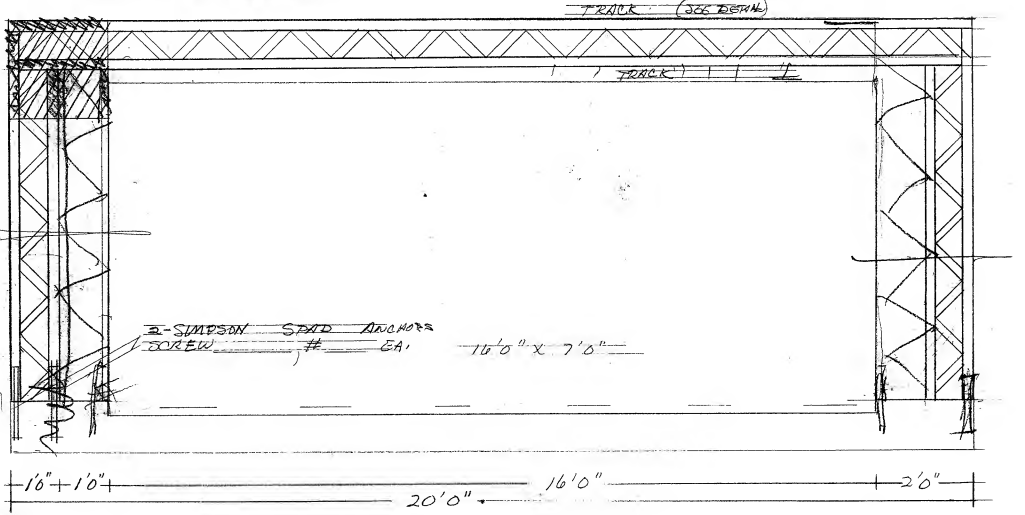
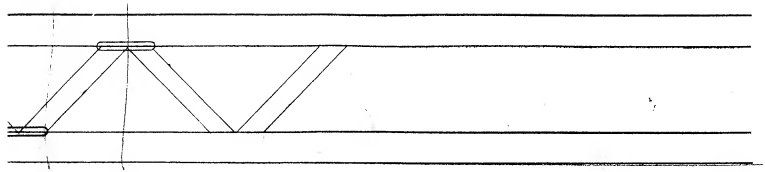


EXHIBIT 7

B-2



TO LW51
FROM DARRELL
12-27-95

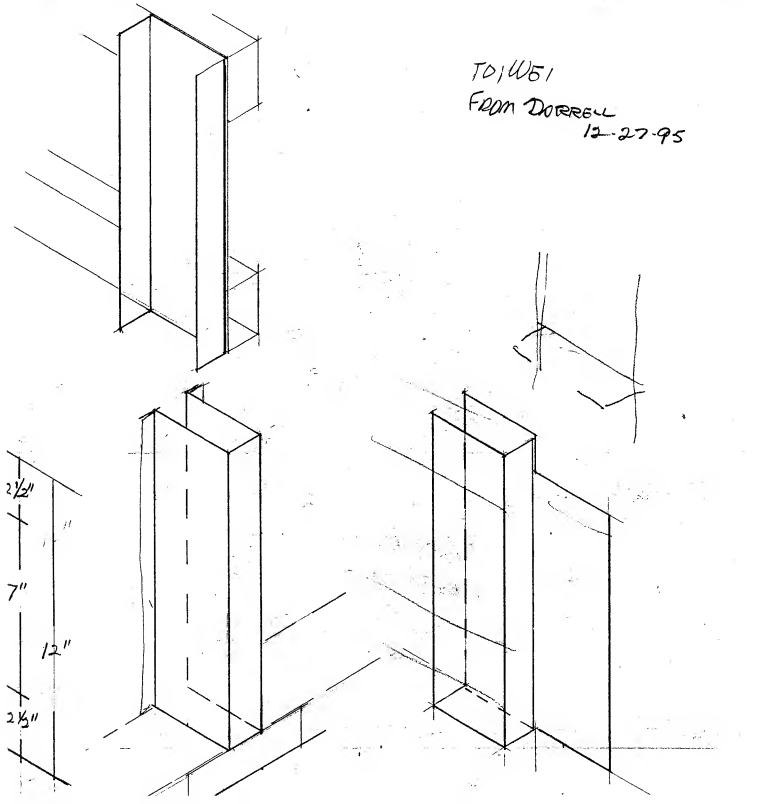


EXHIBIT 8

WED 2-14-96 4-1P
TUES 3-26-96
DON MOODY
WESTERN METAL 800 365-5284
6510 GENERAL DRIVE

UNCOILER - DOUBLE USED	15,000
PUNCH PRESS 75 TON USED	30 000
TOOLING - DIE A	25 000
ROLL FORMER 15 STA. 3"	46,000
[illegible] - 15 TOOL - PUNCH	15 000
TOOLING - ROLL FORMER	30 000
DAVO MOTOR CONTROL	10,000
FLYING FLANGE, FRAME & CONTROL	25 000
TOOLING - FLANGE	30,000
STACKING & CONVEYOR SYSTEM	10,000
[illegible] SHEAR - 24 GA SW	10,000
	*243,000

B Moody 3-26-96

EXHIBIT 9

Darrell G. Meyer

18 Vista Encanta
San Clemente, CA 92672
(714) 631-9295

February 16, 1996

Mr. Donald R. Moody, P. E.
President and CEO
Western Metal Lath
6510 General Drive
Riverside, CA 92509

Re: Trusteel Joist

Dear Mr. Moody,

Thank you for the opportunity to meet with you on Wednesday, February 14. I enjoyed being able to discuss my invention and contemplated methods of manufacturing the tubular steel joist.

As we discussed, this tubular, welded truss assembly functions as a structural member in many applications. In addition to floor or ceiling joists, You can use it as a header, in shear-seismic, panels in combination with headers, or as columns in multistory construction.

Gouvis Engineering of Newport Beach, CA, has generated the computer model used for the calculations provided to date. Gouvis will be furnishing tables on load bearing joist spans and shear-seismic analyses. I will arrange for joint meetings as we deem necessary.

I appreciate your assurance of confidential proprietary rights. I look forward to your thoughts on how we can turn this relationship into a mutually rewarding opportunity.

Sincerely,

Darrell G. Meyer

DGM/lw

cc: Gouvis Engineering

EXHIBIT 10

WESTERN METAL
LATH & STEEL FRAMING SYSTEMS

February 16, 1996

Mr. Darrell G. Meyer
TRUSSTEEL
13269 Soft Cloud Way
Victorville, CA 92392

Re: Steel Floor Truss

Dear Darrell:

It was a pleasure meeting you earlier this week and we appreciate the opportunity to consider your steel floor truss idea.

We have run some very preliminary numbers and at this early stage they look encouraging. Some of the things that would help us refine the numbers are the following:

- Load Tables for the Trusses with 20 gage, 18 gage, and a combination of 20 gage and 18 gage chord members.
- Market Prices of competing products (open web only)
- The current size of the open web floor joist market.
- The anticipated roll forming and assembly rate (feet per minute)
- Some details on end treatments (where the web spacing does not work out exactly).

We'll also try to research some of the above, but anything you can come up with would probably accelerate the process. In addition, you should be thinking of how you might want to structure the potential royalty and license agreements. I have some ideas which we can discuss when appropriate, but if your desires are significantly different I would need to consider them in assessing the overall product feasibility.

I'll call you sometime during the week of the 26th to arrange our next meeting.

Very truly yours,

Donald R. Moody, P.E.
President/CEO

6510 General Drive • Riverside, CA 92509 • (909) 360-3500 • FAX (909) 360-3131

EXHIBIT 11

THU
2-22

ALPINE TRUSS ALPINE/UNIMAST 800 755-6005

MAY

3/4"x 3"

NO INTEREST IN FLOOR TRUSS

ESSONDDO TRUSS

14

CINDY

38' SPAN

11 16"

35' - 14" 130

16' SPACE

14 16" 15 RISER I 2 3- 205 3.25 $165.00

GUS TRUSS - WESTERN METAL 800 365-5284
COST 3.00 BID 3.80
50X TUBE

MITEK - DIETRICK — MIKE FELLACK 800-325-8075

ALPINE / UNIMAST 800 755-6005

TRI-CHORD 619 588-2591
RETAIL $2.25 (250-265)

INTEGRA

RAY GRAGE - ENGINEER 800 472-4302
350 RAILROAD CANYON SUITE A
AMAT

TOMEN BLDG, COMPONENTS 919 428-1600

TRUSWALL, ARLINGTON TX 800 521-9790
PERRIS CALIF TRUSS 909 657-7491
POMONA WD 909 623-2448
MARILYN TEIELD
TUSTIN BLDG PLANNING 714 573-4447

TRUSSJOIST MACMILLAN TJL
CORONA 800 969-6772
MARK DAVIS 714 937-5055
14" MIN. OPEN WEB, CUSTOM WEB
PRICE # 3. TO 3.
LOAD 40/10 ~~40~~ 50/20

TJI. 35 DF
11 7/8 DEPTH

SPAN			
	PRO 16" O/C ~~16~~	17'7"	1.20
	35 16" O/C	20'9"	1.50
	24 OC	14'9"	
10/40	PRO 24 O/C	18'2"	1.50 QUOTE LUMBER

LAMINATED 1½ x 1½" > 3/8" WEB WEIGHT 2.2 LBS/FT.
2 5/16 x 1½" > D.F.

THU
2-22

DON MOTT

TRI-CHORD ELEVATION 619 588-2591
CURT KINNEY GAIL VAN AKEN, NV 702 642-7598
IN L.V.
C
24" DEPTH 90 LB. 28'6" TOP CORD
PRESS JOINT
12" DEPTH $1.65 PER FT.
24" O.C. ~~28'~~ 18'6"
19.2. 20' 20'
BOT CHORD BEARING
ALL CUSTOM MADE
JAMES TRUSS CRAIG ROAD & I 15

12" 12' STAN I GIRDER $1.60 LIN. FT.
QUOTE GAIL 3-~~8~~ 3-4 10,00 F.O.B. YD.

11 16 35 -4
12 TRUSSES 1.52 1.65 7-12.96
14 GIRDER
16 PRO 1.26
SDC 1.52
55 3.04
2x10 12' 12.50 MBM/M
2x12 12' 15.58

THU 2.22

ALPINE / UNIMAST 800 755-6005
GRAND PRAIRIE, TEXAS
JACK [DAVID WILLIS 4160]
NOTHING IN FLOOR TRUSS

MON 2.27 DAVID WILLS
ROOF TROSS JOAN CARPENTER
22, 20, 18
DOUBLE SHEAR SCREW - 1 SIDE ONLY
MANUF. IN MORRO G
WAREHOUSE IN SAATC

THU
2-22

MITEK - DIETRICK 800 325-8075
TOM
DOESN'T FEEL COMPETITIVE WITH WOOD
DOES MAKE POSITRUT (WOOD WEB)

JIM GAIL

MARKET POTENTIAL

Wood Truss Council 608/274-4849
5937 Meadowood Dr., #14
Madison, WI 53711

Kirk Grundahl, Exec. Director (Suzy Sandy)

580 members

(3-19-96)

1992 Production:

I Joists - 223 million feet

Parallel Chord (open) - both wood and steel - 221 million feet

Projection year 2000 joint study with NAHB, George Carter *

I Joists - 530 million feet

Parallel Chord - both wood and steel - 290 million feet

May change name to reflect wood and steel

Mitek - both

Open to steel engineered membership.

*Expect increase primarily due to lower lumber quality.

DRM 4-3-96

EXHIBIT 12

714-361-9295

GOUVIS ENGINEERING

NEWPORT BEACH • SAN DIEGO • PALM SPRINGS

GOUVIS ENGINEERING

FAX TRANSMITTAL

DATE: 2/29/96

TO: DARRELL METER

FAX NUMBER: 619-955-9736

ATTENTION:

FROM: WEI

PROJECT NAME:

GE JOB NUMBER: 12250

NUMBER OF PAGES: 2 **(INCLUDING THIS TRANSMITTAL)**

REMARKS: I SQUEZED OUT A LITTLE BIT OF TIME TO GET THIS FAR. I DON'T KNOW IF I CAN GET ANY TIME ON THIS TO FINISH THE TABLE. I HOPE THIS HALF CAN HELP YOU. LET ME KNOW WHEN YOUR MEETING IS.

IF YOU HAVE ANY QUESTIONS, OR IF YOU DID NOT RECEIVE ALL PAGES, OR PORTIONS OF THIS TRANSMITTAL ARE ILLEGIBLE, PLEASE DO NOT HESITATE TO CALL THIS OFFICE.

4400 CAMPUS DRIVE • NEWPORT BEACH, CALIFORNIA 92660 • (714) 752-1612 • FAX (714) 752-5321
2150 EAST TAHQUITZ CANYON, SUITE 9 • PALM SPRINGS, CALIFORNIA 92262 • (619)323-5090 • FAX (619)325-2863
1747 HANCOCK STREET, SUITE B • SAN DIEGO, CALIFORNIA 92101 • (619) 295-5174 • FAX (619) 295-1579

SPAN TABLE (CENTER TO CENTER)

LOAD	TRUSS I	TRUSS II	TRUSS III	TRUSS IV	TRUSS V
DL=10 LL=40 TL=50	T/C : 20GA, 33G B/C : 20GA, 33G	T/C : 18G, 33G B/C : 20G. 33G END = 18G	20G, 50G 20G, 33G END = 20G	18G, 50G 18G, 33G END = 18G	18G, 50G 20G, 50G END : 18G
		16'-10" $\Delta_{TL} = .441" = \frac{L}{457}$ $\Delta_{LL} = \frac{L}{572}$	16'-5" $\Delta_{TL} = .449 = \frac{L}{439}$ $\Delta_{LL} = \frac{L}{549}$	19'-7" $\Delta_{TL} = .667" = \frac{L}{342}$ $\Delta_{LL} = \frac{L}{428}$	19'-9 1/2" $\Delta_{TL} = .825" = \frac{L}{288}$ $\Delta_{LL} = \frac{L}{360}$
TL=20 LL=40 TL=60					

EXHIBIT 13

FRI 3-8

TRUSS WALL

CALIF. TRUSS - DON 909 657-7491

12-16

11 1/4" & 2.71 40 LL 10-12 &

12 714

16

24

14 1/4 2.97

FLOOR JOIST PRODUCT COMPARISON

MAX. SPAN / SPACING / COST ANALYSIS

COMPARISON

JOIST DEPTH	JOIST SERIES	COST LIN. FT.	SPACING 12" O.C. SPAN	12" O.C. COST S.F.	16" O.C. SPAN	16" O.C. COST S.F.	24" O.C. SPAN	24" O.C. COST S.F.
9 1/4"	2x10 D/F	.97	17'5"	.97	13'11"	.72	12'3"	.48
11 1/4"	2x12 D/F	1.24	20'2"	1.24	16'7"	.93	14'3"	.62

MAX STD. LNGTH	DLR STOCK LNGTH	CUT TO ORDER	CUSTOM ORDER	REQ. BLKG.	REQ. CAPS	MULTI-SPAN MX	WEIGHT FT.

	DLR STK LENGTH	CUT TO ORDER	CUSTOM ORDER
	20'		
	20'		
TJI	40'	YES	
TOUSWAL		YES	
TJL		YES	

CUT TO ORDER

ORDER TO LENGTH

CUSTOM ORDER

2x10 .83
2x14

L /360

* 16"OC - 1/3 MORE #

	JOIST DEPTH	JOIST SERIES	12" O.C.	16" O.C.	COST S.F.	24" OC	COST S.F.
#2+ 600/M	9 1/4"	2X10 SOLID WD.					
#2+ 620	11 1/4"	2X12 SOLID WD.		15'8"		12'9"	
1.33 LIN.	11 7/8"	TJI/ 25 PRO		18'1"		14'9"	
1.56 LIN	11 7/8"	TJI/ 25 DF		21'4"		18'9"	
2.88 LIN	11 7/8"	TJI/ 55 DF		29'9"		22'10"	

GAMMA

JOIST DEPTH | JOIST SERIES

12" TRUSS WALL (STL WEB)

14" TRUSSWALL (STL WEB)

16" 24"

12" OPEN WEB (WD)

14" OPEN WEB (WD) 20'

16"

MULTI-SPACING
32' 36'

FAX 3-7.95

CINDY

ESCONDIDO TRUSS 800 367-8787

2x4 & 2x4

14"

20,000 LN FT.

100 TRUSS

100 TRUSS 20' 2010

20

225

100 - 20' 2000 $4730

$2.36

2 | 4730

MILGARD 909 676-2688
TEMECULA

SALES

3/4"
[

FRI - 3-7-96

GANG NAIL FONTANA

16
20

JOE 14" $270 $280

UP TO 22 SPAN UP $40 O/A

CUSTOM MADE

16 24

JOIST DEPTH	JOIST SERIES
14"	TJL

LIN.		
1.38	~~11 7/8~~	LPI 26
1.98	11 7/8	LPI 36 2¼ CONC
1.56	11 7/8	LPI 32

FAN AH 2

SPAN

JOIST DEPTH	JOIST SERIES	PER ft	16"O.C	COST S.F.	24"OC	COST S.F.
		18 872				
10"	1000 EJ-2" 16 GA	1127	20'11"		18'3"	
		14 1403				
10"	1000 EJ 2" 14 GA		22'6"		19'8"	
12"	1200 EJ 2" 16 GA	1273	24'4"		20'8"	
		14 1586				
12"	1200 EJ 2" 14 GA		26'2"		22'10"	

EJ 2"

PER DON [illegible] 7-96

1.50 .33 KSI +2-3%

2-3%

JOIST TYPE/SERIES	JOIST DEPTH	COST LIN FT	12" O.C. SPAN	12" O.C. COST SF	16" O.C. SPAN	16" O.C. COST S.F.	24" O.C. SPAN	24" O.C. COST S.F.
2x10 DF #2+	9¼"	$ .97 ①						
2x12 DF #2+	11¼"	$1.24 ①						
TRUSWAL STR. WEB	11.25	$2.70						
TRUSS WAL 4X2 STL WEB	14.25	$2.80						
DOUG FIR 2X10 #2+								
STEEL C 1000 EJ	10"							
1200 EJ	12"							

SOURCE ① GANAHL LUMBER

GOUVIS ENGINEERING

NEWPORT BEACH • SAN DIEGO • PALM SPRINGS

GOUVIS ENGINEERING

FAX TRANSMITTAL

DATE: 3/13/96

TO: DARRELL METER

FAX NUMBER: 285-1369

ATTENTION: DARRELL

FROM: WEI

PROJECT NAME:

GE JOB NUMBER: 12250

NUMBER OF PAGES: 2 (INCLUDING THIS TRANSMITTAL)

REMARKS: FURTHER FINE-TUNING TO MAXIMIZE COST IS POSSIBLE.

CALL ME IF YOU HAVE Q'S

IF YOU HAVE ANY QUESTIONS, OR IF YOU DID NOT RECEIVE ALL PAGES, OR PORTIONS OF THIS TRANSMITTAL ARE ILLEGIBLE, PLEASE DO NOT HESITATE TO CALL THIS OFFICE.

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1747 HANCOCK STREET, SUITE B • SAN DIEGO, CALIFORNIA 92101 • (619) 295-5174 • FAX (619) 295-1579

TRUSS III

TC = 20GA/50 BOT. C. = 22G/50 WEB = 25GA

END = 20GA

24" O/C | 16" O/C | 12" O/C

10PSF=LL
40PSF=LL

16'-3" | 19'-10" | 23'-0"

TRUSS V

TC = 18G/50, BC = 20G/50, WEB = 25-G/33-

END = 18G

10=10 PSF
LL=40PSF

19'-7" | 22'-8" | 25'-0"

EXHIBIT 15

TRUSSTEEL JOIST
COMPETITIVE PRODUCT COMPARISON
Maximum Span / Spacing / Cost

Joist Type	Joist Depth	Cost Per lin. ft.	12" O/C Span	12" O/C Cost Per sq. ft.	16" O/C Span	16" O/C Cost Per sq. ft.	24" O/C Span	24" O/C Cost Per sq. ft.	Std Lgth.	Dlr Stk	CTS	Order Lgth.	Cstm Mfg.
1000 EJ 18ga.	10"	$ 0.88		$ 0.88		$ 0.66		$ 0.44	20'			yes	
1000 EJ 16ga.	10"	$ 1.13	23'0"	$ 1.13	20'11"	$ 0.84	18'3"	$ 0.57	20'			yes	
1000 EJ 14ga.	10"	$ 1.41	24'10"	$ 1.41	22'6"	$ 1.06	19'8"	$ 0.71	20'			yes	
1200 EJ 16ga.	12"	$ 1.28	26'9'	$ 1.28	24'4"	$ 0.96	20'8"	$ 0.74	20'			yes	
1200 EJ 14ga.	12"	$ 1.59	28'10"	$ 1.59	26'2"	$ 1.19	22'10"	$ 0.80	20'			yes	
TRI-CHORD	12"	$ 2.20		$ 2.20		$ 1.65		$ 1.10					yes
TRI-CHORD	14"	$ 2.60		$ 2.60		$ 1.95		$ 1.25					yes
Trussteel 20 ga.	**12"**	**$ ~~2.20~~ 1.60**	**~~23'0"~~ 23'4"**	**$ 2.20**	**~~19'10"~~ 21'8"**	**$ 1.50**	**~~16'7"~~ 17'3"**	**$ 1.10**		**40'**	**yes**	**yes**	**yes**
Trussteel 18 ga.	**12"**	**$ ~~2.50~~ 1.95**	**~~25'6"~~ 25'8"**	**$ 2.50**	**~~22'6"~~ 23'4"**	**$ 1.88**	**~~19'9"~~ 20'3"**	**$ 1.25**		**40'**	**yes**	**yes**	**yes**

BUSINESS FORMATION PLAN AGENDA

- Form new stock corporation (Corp)
  Issue stock 50% Angeles Metal Systems (AMS)
  Issue stock 50% Darrell G. Meyer (DGM)
- Elect officers & board
- Determine legal & accounting firm/method
- AMS Loan (capitalize) Corp. commitment $100,000
- Purchase order & check procedure
- Inventor (DGM) proceed with patent application (use patent)
- DGM assign patent rights to Corp, same distribution license fees

BUDGET (DETAIL SHEET 1)
MACHINES, TOOLS & FIXTURES

1.	Automatic Resistance Welder See Janda Proposal			$45,000
2.	Truss Assembly Jig Anaheim Welding - verbal			$6,000
3.	Rollers, Stands Hytrol - verbal	Rollers Stands Tax, freight	$1,254 472 240 $1,966	$2,000
4.	Chain Transfer, Accumulator 3 - 12' chain assemblies, frames electric drive, pneumatic lift custom - Bid - Anaheim Welding			$4,000
5.	Miller Spot Welder & O.H. Track Air $2,000, elect, track - etc.			$3,000
6.	Racks, Dollies, Chord Handling Lifts custom			$5,000
7.	Banding, Shipping			$2,000

SCHEDULE TO 3 MONTH START-UP

Engineering $5,000

Provide load / span tables, start ICBO

Advertising & marketing

Draft copy and layout to start campaign with engineers, place ads in trade magazines, Metal Home Digest, Automated Builder

Salaries

Darrel G. Meyer to supervise all custom manufacturing, purchase equipment, layout plant, participate in marketing and sales. Joe Mackewich in strong sales program, brochures, ads, personal calls

Rent

Locate approx. 12,000 s.f. within Angeles facility. Rent @ 20 cents per s.f. - $2,400

Utilities

TRUSSTEEL JOIST
PRODUCT COMPARISON
WOOD FLOOR JOISTS
MAXIMUM SPAN-SPACING-COST

L/360 Live Load Deflection--40#LL+10#DL

Joist type/series	Joist Depth	Cost Lin Ft.	12" O/C Span	12" O/C Cost Sq. Ft.	16" O/C Span	16" O/C Cost Sq. Ft.	24" O/C Span	24" O/C Cost Sq. Ft.	Std Lngth.	Dir. Stck	CTS	Cstm Mfg.
Doug Fir 2x10#2	9 1/4"	$ 0.97	17'5"	$ 0.97	13'11"	$ 0.72	12'3"	$ 0.48	20'			
Doug Fir 2x12#2	11 1/4"	$ 1.24	20'2"	$ 1.24	16'7"	$ 0.93	14'3"	$ 0.62	20'			
Trus Joist:												
TJI 25 Pro	11 7/8"	$ 1.33		$ 1.33	18'1"	$ 1.00	14'9"	$ 0.67		40'	yes	
TJI 25 DF	11 7/8"	$ 1.56	23'4"	$ 1.56	21'4"	$ 1.17	18'4"	$ 0.78		40'	yes	
TJI 55 DF	11 7/8"	$ 2.88	28'8"	$ 2.88	26'1"	$ 2.16	22'10"	$ 1.44		40'	yes	
Wood Web 4x2 4x2	14"	$ 2.36		$ 2.36		$ 1.77		$ 1.18				yes
Wood Web 4x2 4x2	16"	$ 2.50		$ 2.50		$ 1.88		$ 1.25				yes
Truswal 4x2 stl wb	11 1/4"	$ 2.71	23'4"	$ 2.71	19'3"	$ 2.03	12'10"	$ 1.36				yes
Truswal 4x2 stl wb	14 1/4"	$ 2.97	27'5"	$ 2.97	20'7"	$ 2.22	13'8"	$ 1.49				yes
TrustJoist TJL 4x2	14"	$ 3.40		$ 3.40		$ 2.55		$ 1.70				yes
TrustJoist TJL Lam	14"	$ 4.00		$ 4.00		$ 3.00		$ 2.00				yes
Louisiana Pacific:												
LPI 26	11 7/8"	$ 1.38	22'8"	$ 1.38	20'9"	$ 1.04	17'2"	$ 0.69		40'	yes	
LPI 36 2 1/4"	11 7/8"	$ 1.94	23'9"	$ 1.94	23'0"	$ 1.49	20'0"	$ 0.99		40'	yes	
LPI 32	11 7/8"	$ 1.56	24'6"	$ 1.56	22'0"	$ 1.17	18'10"	$ 0.78		40'	yes	
GangNail 4x2 4x2	14"	$ 2.70		$ 2.70		$ 2.02		$ 1.35				yes
GangNail 4x2 4x2	16"	$ 2.80		$ 2.80		$ 2.10		$ 1.40				yes

Source:
GANAHL
ESCONDIDO TRUSS
CALIFORNIA TRUSS
TJI McMILLAN
GANGNAIL

TRUSSTEEL JOIST
PRODUCT COMPARISON
WOOD FLOOR JOISTS
MAXIMUM SPAN-SPACING-COST

L/360 Live Load Deflection--40#LL+10#DL

UPDATE 7-10

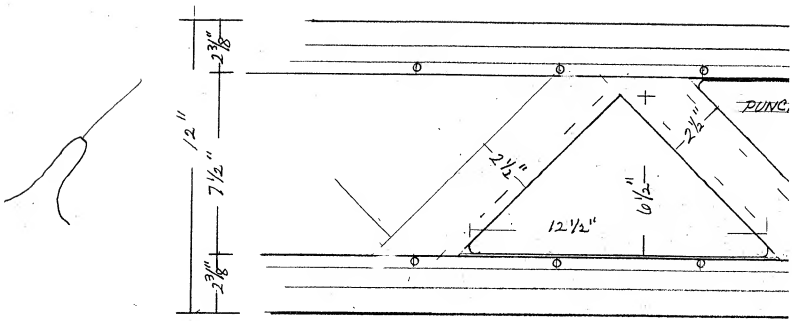
	Joist type/series	Joist Depth	Cost Lin Ft.	12" O/C Span	12" O/C Cost Sq. Ft.	16" O/C Span	16" O/C Cost Sq. Ft.	24" O/C Span	24" O/C Cost Sq. Ft.	Std Lngth.	Dlr. Stck	CTS	Cstm Mfg.
GAN 1.04	Doug Fir 2x10#2	9 1/4"	$ 0.97	17'5"	$ 0.97	13'11"	$ 0.72	12'3"	$ 0.48	20'			
1.30	Doug Fir 2x12#2	11 1/4"	$ 1.24	20'2"	$ 1.24	16'7"	$ 0.93	14'3"	$ 0.62	20'			
	Trus Joist:												
GAN 1.26	TJI 25 Pro 1.61	11 7/8"	$ 1.33		$ 1.33	18'1"	$ 1.00	14'9"	$ 0.67		40'	yes	
1.52	TJI 25 DF	11 7/8"	$ 1.56	23'4"	$ 1.56	21'4"	$ 1.17	18'4"	$ 0.78		40'	yes	
3.04	TJI 55 DF	11 7/8"	$ 2.88	28'8"	$ 2.88	26'1"	$ 2.16	22'10"	$ 1.44		40'	yes	
ESC 3.42	Wood Web 4x2 4x2	14"	$ 2.36		$ 2.36		$ 1.77		$ 1.18				yes
"	Wood Web 4x2 4x2	16"	$ 2.50		$ 2.50		$ 1.88		$ 1.25				yes
MILTRUS 2.80	Truswal 4x2 stl wb	11 1/4"	$ 2.71	23'4"	$ 2.71	19'3"	$ 2.03	12'10"	$ 1.36				yes
3.00	Truswal 4x2 stl wb	14 1/4"	$ 2.97	27'5"	$ 2.97	20'7"	$ 2.22	13'8"	$ 1.49				yes
	TrustJoist TJL 4x2	14"	$ 3.40		$ 3.40		$ 2.55		$ 1.70				yes
	TrustJoist TJL Lam	14"	$ 4.00		$ 4.00		$ 3.00		$ 2.00				yes
	Louisiana Pacific:												
	LPI 26 1.49	11 7/8"	$ 1.38	22'8"	$ 1.38	20'9"	$ 1.04	17'2"	$ 0.69		40'	yes	
	LPI 36 2 1/4"	11 7/8"	$ 1.94	23'9"	$ 1.94	23'0"	$ 1.49	20'0"	$ 0.99		40'	yes	
	LPI 32	11 7/8"	$ 1.56	24'6"	$ 1.56	22'0"	$ 1.17	18'10"	$ 0.78		40'	yes	
	GangNail 4x2 4x2	14"	$ 2.70		$ 2.70		$ 2.02		$ 1.35				yes
	GangNail 4x2 4x2	16"	$ 2.80		$ 2.80		$ 2.10		$ 1.40				yes

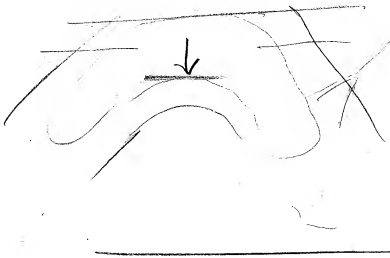
Source:
GANAHL ESTIMATE
ESCONDIDO TRUSS
CALIFORNIA TRUSS
TJI McMILLAN
GANGNAIL

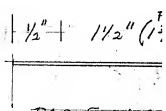
12 MOS. PRELIMINARY CASH FLOW PROJECTION
(INCLUDING 3 MOS. START-UP) POSTIVE <NEGATIVE>

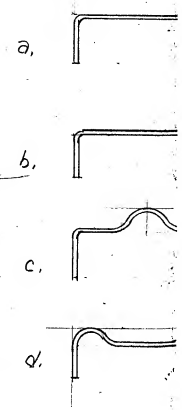
	% of Schedule	Total 3 mos.	4	5	6	7	8	9	10	11	12	Total
Sales Revenue (1)		-0-	(E) 50,000	(E)100,000	(E)100,000	150,000	150,000	150,000	150,000	150,000	150,000	1,125,000
Cost to Produce (2)						86,000						
Gross Profit / Margin						64,000						
Selling - Commission	(3%)		1,500	3,000	3,000	4,500						
Market - Advertising	(3%)		1,500	3,000	3,000	4,500						
Total Selling Cost			3,000	6,000	6,000	9,000						
Profit Before Expenses, G & A	(36%)		18,000	36,000	36,000	55,000	55,000	55,000	55,000	55,000	55,000	420,000
Expenses												
Engineering - Consultant			1,000	1,000	1,000	1,000						
Salaries - Officers						4,000						
Rent						2,400						
Utilities						1,500						
Telephone						500						
Vehicle, Travel, Entertainment						800						
Legal & Accounting						1,000						
General Office Expense, postage etc						500						
Insurance - Liability	(2%)					3,000						
Depreciation 120 mo - 60 mo.						2,000						
Total Expenses	(11%)		16,700	16,700	16,700	16,700	16,700	16,700	16,700	16,700	16,700	150,300
Total Startup, Machines, Fixtures, Jigs-3 mo		116,500										
Monthly over <short>			1,300	19,300	19,300	38,300	38,300	38,300	38,300	38,300	38,300	269,700
Cash Flow over <short>		<116,500>	<115,200>	<95,900>	<76,600>	<38,300>	-0-	38,300	76,600	114,900	153,200	
Net Cash after 12 mos.											+116,500	
Net Profit												269,700

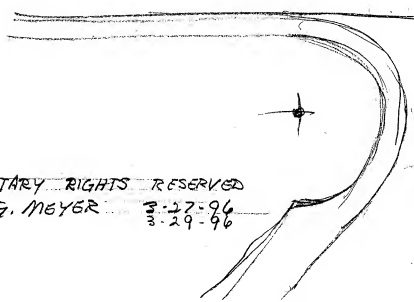
EXHIBIT 16











3-27-96
3-29-96

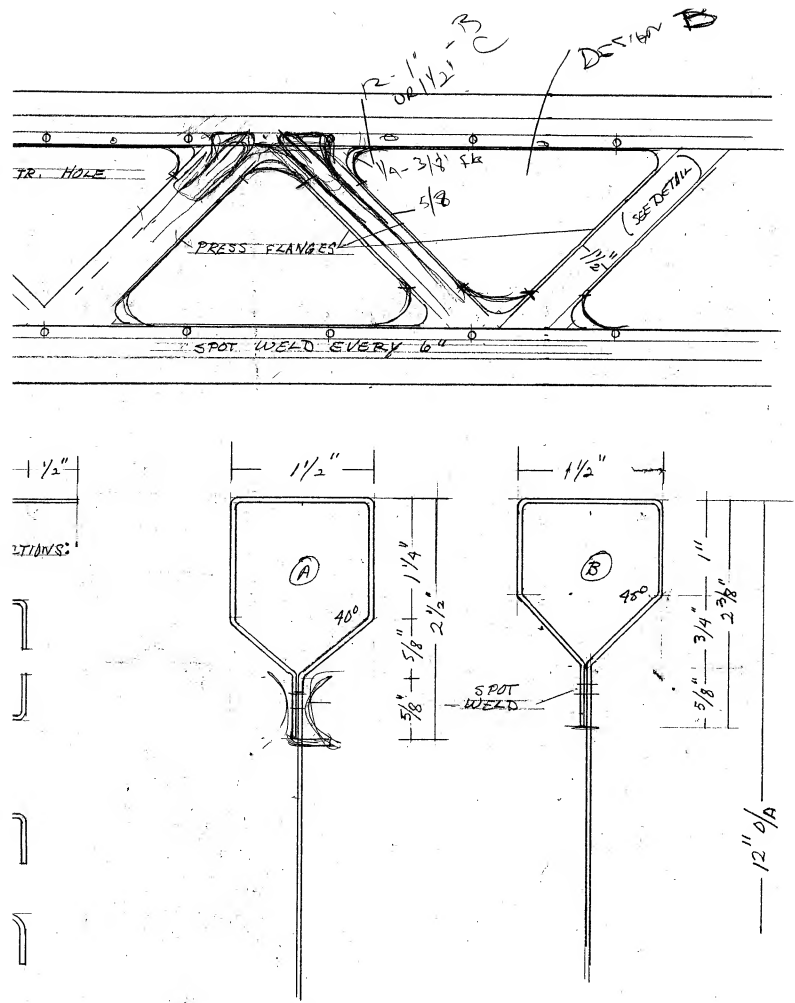
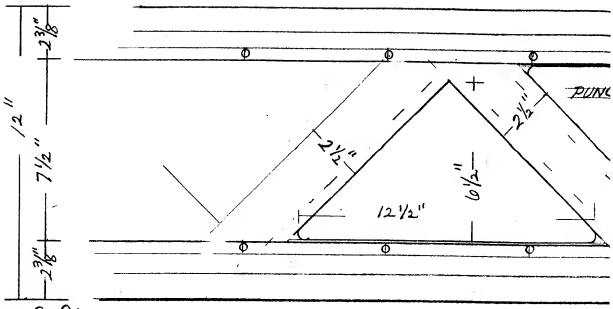

DETAIL B
R 1" OR 1½"
TR. HOLE
1/4 - 3/8 SK
5/8
PRESS FLANGES
(SEE DETAIL
1½"
SPOT WELD EVERY 6"
1½"
1½"
A
40°
1¼"
2½"
5/8" + 5/8"
B
45°
1"
2 3/8"
3/4"
5/8"
SPOT WELD
12" O/A

EXHIBIT 17

HOLE PUNCH



FRI 3-29-96

DEAR NICK —

THIS COMPOSITE DRAWING REFLECTS CHOICE OF TOP/BOTTOM CORD SECTION - EITHER A OR B AND POSSIBLE SECTIONS TO BE STAMPED IN WEBS.

WEB INDICATED PROPERTIES SEEM SIMILAR & O.K.

DON MOODY — WESTERN, SAID HE REALLY LIKED IT! "YOU HAVE A HOME RUN!"

1/2" + 1 1/2" (1

POSS. FLANGE

a,

NOT PROPRIETA

b,

c,

d,

EXHIBIT 18

April 3, 1996

LETTER OF INTENT

This Agreement is entered into this day by and between the following Parties:

Darrell G. Meyer, (Hereinafter referred to as DGM)

Western Metal Lath (Hereinafter referred to as WM).

Recitals:

DGM has invented and is in the process of obtaining a patent (patents) on a fabricated steel "Trussteel Joist" and has developed know-how in connection with said invention.

WM desires to acquire an option to investigate said DGM invention and if favorable to proceed with license to manufacture said "Trussteel Joist", per License Agreement format as mutually agreed.

DGM will grant WM option for $75,000 payable: $25,000 upon execution of Option Agreement, $25,000 when satisfied and enters into License Agreement and $25,000 upon start-up of production.

DGM will share know-how with WM and coordinate engineering, testing of trusses, design of special machines, fixtures and components for manufacturing and such activities as per WM. DGM will be compensated at the rate of $5,000 per month, not to exceed 6 months, time of start-up or termination of option.

Outside services required or requested will be submitted to WM for prior approval and payment by WM.

Royalty rate of 4¢ per foot of sales with minimum annual royalty of $40,000

WM to have exclusive license for 12 western states.

GRANTOR
Darrell G. Meyer

By_____
Darrell G. Meyer
18 Vista Encanta
San Clemente, CA 92672
(714) 361-9295

GRANTEE
Western Metal Lath

By_____
Donald R. Moody, President/C.E.O.
6510 General Drive
Riverside, CA 92509
(909) 360-3500

EXHIBIT 19

WESTERN METAL
LATH & STEEL FRAMING SYSTEMS

April 23, 1996

Mr. Darrell G. Meyer
TRUSSTEEL
13269 Soft Cloud Way
Victorville, CA 92392

Re: Steel Floor Truss

Dear Darrell:

This is verify that Western Metal Lath is interested in obtaining exclusive manufacturing, marketing, and distribution rights for the western United States for the light gage steel floor truss you are developing. During our discussions we have reached tentative agreement on the following terms and conditions:

- Western's exclusive manufacturing, marketing, and distribution area would include the states of California, Washington, Oregon, Montana, Idaho, Colorado, Utah, Nevada, Arizona, New Mexico, Wyoming, Texas, Alaska, and Hawaii.

- In exchange for the exclusive rights described above, Western would pay you a one time license fee of $75,000 plus the amount you invest in the development of this product (engineering, testing, documentation, patents, etc.) between now and the time the license agreement is formalized and agreed upon. Any expenditures made by Western toward the development of the product would apply against the final negotiated licensing fee.

- In addition to the license fee, Western would pay you a royalty of $.04 per lineal foot of truss produced and sold by Western with a guaranteed minimum of $40,000 per year in royalties, regardless of sales.

This letter, while expressing our interest and general agreement to the preliminary terms of the anticipated licensing arrangement, is not an agreement of any type between Western Metal Lath and Darrell Meyer. Prior to entering into any agreement beyond mutual cooperation toward the development of the product, the floor truss will have to be fully developed to the extent that a patent has been obtained, certified engineering data substantiated by testing exists, and an IBC-ER approval has been obtained. Additionally, the final agreement will require the approval of Western Metal Lath's Board of Directors.

6510 General Drive • Riverside, CA 92509 • (909) 360-3500 • FAX (909) 360-3131

That being said, we would like to emphasize our belief the floor truss you are developing, based on our prelitminary analysis, is a viable product that will be well positioned to participate in the very significant open web floor joist market. We appreciate the opportunity you have presented to us and look forward to a long and mutually beneficial relationship with you.

Very truly yours,

Donald R. Moody

Donald R. Moody, P.E.
President/CEO

EXHIBIT 20

LANE AND RODERICK, INC.
12640 Allard Street
Santa Fe Springs, CA 90670
TELEPHONE: 1-310-868-3465
FAX: 1-310-929-8791

QUOTATION LETTER

No. 02719

TO: TRUSSTEEL INC. BEVERLY
13269 SOFT CLOUD WAY
VICTOR VILLE, CA 92392

DATE: 05/14/96

ATTN: DARRELL MEYER
RFQ.#:

PHONE: (714) 361-9295
FAX: (714) 285-1369

DELIVERY	FOB	SHIP VIA
2 WEEKS	SANTA FE SPRINGS	YOUR TRUCK

QUANTITY ITEM#	DESCRIPTION	UNIT PRICE	EXTENSION
1	QUOTE# 08631 TRUSS 240.00 LONG REV N/C		
	TRUSS 240.00 LONG		
3		384.17	1,152.51
4		335.10	1,340.40

ITEM# QUOTE# 08631

8.25 + TAX $1,450.98

SHEAR, LASERCUT FORM AND SPOT WELD

CUSTOMER SUPPLIED 20 GA ZINCALUM PER BP

Quoted By: Warren, Brian C.

UNLESS OTHERWISE STATED HEREIN;PRICES REMAIN IN EFFECT 30 DAYS;PRICES DO NOT INCLUDE LOCAL OR STATE TAXES IF APPLICABLE;TERMS NET 30 DAYS WITH APPROVED CREDIT;FOB FACTORY;UNPAID BALANCES 30 DAYS PAST DUE WILL BE SUBJECT TO AN INTEREST CHARGE OF 1.5% PER MONTH (ANNUAL RATE 18%) FUTURE ORDERS WILL BE AUTOMATICALLY SOLD ON A C.O.D. BASIS

EXHIBIT 21

Lane & Roderick, Inc.

PACKING SLIP

No. 05796
Page 1

SHIP TO:

TRUSSTEEL INC.
13269 SOFT CLOUD WAY
VICTOR VILLE, CA 92392

Phone: (714) 361-9295

P.O. No.	Ship Via	Terms	Date Shipped	CustID
VERBAL	YOUR TRUCK	COD	05/03/96	T1035

Quantity	Description		
4	TRUSS 240.00 LONG	Rev : N/C	(Our Number 05796)
	TRUSS 240.00 LONG		
	1 EA. CUSTOMER BLUEPRINT		

BY: [signature] Date: 5-3-96

UNPAID BALANCES 30 DAYS PAST DUE WILL BE SUBJECT TO AN INTEREST CHARGE OF 1 1/2% PER MONTH (ANNUAL RATE 18%). FUTURE ORDERS WILL AUTOMATICALLY BE SOLD ON COD BASIS.

EXHIBIT 22

WESTERN METAL LATH
6510 GENERAL DRIVE
RIVERSIDE, CA 92509
(909) 360-3500

DRAWN ON
PNC BANK, OHIO, NATIONAL ASSOCIATION
MILFORD, OHIO
IN COOPERATION WITH
WELLS FARGO BANK, N.A.
#4789-808850
56-204/422

№ 001133

DATE 6/5/96

PAY ONE THOUSAND FOUR HUNDRED FIFTY AND 98/100********** DOLLARS $1,450.98*****

TO THE ORDER OF
LANE AND RODERICK, INC.

WESTERN METAL LATH

⑈001133⑈ ⑆042202044⑆ 77098 25291⑈

REMITTANCE STATEMENT

DATE	NUMBER	DESCRIPTION	ACCT. NO.	GROSS AMOUNT	DEDUCTIONS	NET AMOUNT
		SEE ATTACHED	41080500	1450.98		1450.98

Printed on recycled paper to protect the environment.

DETACH BEFORE DEPOSITING

WESTERN METAL LATH
6510 GENERAL DRIVE, RIVERSIDE, CA 92509
(909) 360-3500

GBF 9G-73G

EXHIBIT 23

RADCO
• CERTIFICATION • LIFTING
• TESTING • INSPECTION

RESOURCES
APPLICATIONS
DESIGNS &
CONTROLS, INC.

3220 E. 59TH STREET
LONG BEACH, CA 90805
TELEPHONE: (310) 272-7231
TELECOPIER: (310) 529-7513

June 14, 1996

Mr. Darrell Meyer
Trussteel
18 Vista Encanta
San Clemente, CA 92672

Re: RADCO Proposal PR-T6074

Dear Mr. Meyer:

Based on our discussions on June 12, 1996, we will schedule an R&D test of your steel trusses as follows.

1. Trussteel will furnish all materials, including trusses, decking, cross bracing and fasteners.
2. RADCO will provide the supports for each end of the truss assembly.
3. Trussteel will arrange, at Trussteel cost, for the delivery and pickup of lead ingots for use as dead weights.

The test will be performed on only one assembly, consisting of three trusses at 24" oc by approximately 20 feet long. The test procedure will be essentially in accordance with ASTM E 73, Static Load Testing of Truss Assemblies.

The test sequence will be:

1. Load the assembly to dead load in two increments. Take deflection measurements.
2. Load the live load in four increments, with five minutes between each increment. Take deflection readings after each increment.
3. Unload the assembly, allow it to recover, and take deflection readings.
4. Reload the dead and live load in four equal increments, and then continue loading until 2 ½ times live load is reached.

The cost for this test is $1200.00.

Two copies of this letter are enclosed. Please indicate your acceptance of this proposal by signing one copy below and returning it with your check for $600.00. The balance will be due upon completion of the test.

Sincerely,

RADCO

R.F. Tucker, P.E.
President

RFT/mdc

ACCEPTED:
Trussteel

By: Darrell Meyer

Date: 6-20-96

EXHIBIT 24

TRUSSTEEL

June 18, 1996

Mr. Donald R. Moody, P. E., President, C.E.O.
Western Metal Lath
6510 General Drive, CA 92509

Re: Trussteel floor joist static load test

Dear Don:

All necessary arrangements have been made for the testing of the 3-20' floor joistsat the facilities of RADCO, Long Beach, CA, per their proposal enclosed.

The budget items are itemized below:

RADCO test	$1,200
Rental of 12,000 lbs. lead	600
Freight to deliver & pick-up lead	504
Welding of 3 joists (Janda)	195
Labor	150
Plywood & fasteners	140
Hat channel & flat strap	20
Labor to load & unload lead, set up	200
	$3,059

Per agreement, please remit a check in the amount of $3,000 to Darrell G. Meyer and I will proceed with the test schedule per your request for the week of June 24,1996.

Ilook forward to our test results and a great future.

Very truly yours,

Darrell G. Meyer

DGM:BM

18 VISTA ENCANTA,SAN CLEMENTE, CA 92672

EXHIBIT 25

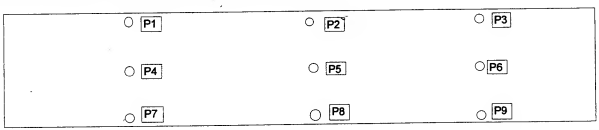
PRELIMINARY

CLIENT:TRUSSTEEL

PRELIMINARY

STATIC LOAD TESTING OF TRUSS ASSEMBLIES, ASTM E-73-83 (reapproved 1991)

Date:	Jul 3, 1996
Time:	1:30 PM
Specimen Size:	4ft.x19ft.8" (236")
Wt. of Lead Ingots	70 lbs. each
Specimen Type:	Steel Truss
Actual Loading Area:	118 sq. ft.
Failure Load: (lbs.)	8400
Failure Load: (psf)	71.186



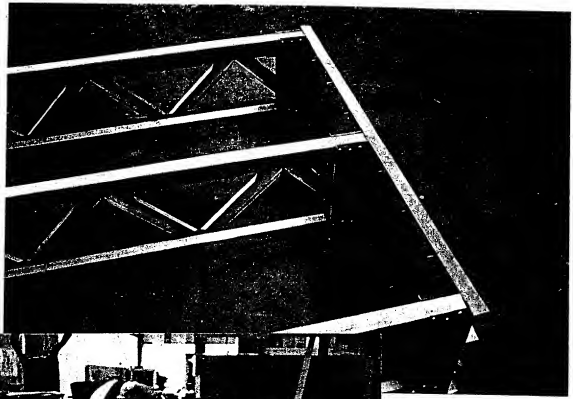
Applied Load		Deflections (in.)									Actual Load	
Live load increments	psf (nominal)	P1	P2	P3	P4	P5	P6	P7	P8	P9	lbs.	psf
Initial (zero load)	0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
0.25 Live Load	10 psf	0.1179	0.1700	0.1251	0.1245	0.1747	0.1381	0.1340	0.1820	0.1360	1260	10.678
After 5 min. hold		0.1181	0.1700	0.1251	0.1252	0.1747	0.1381	0.1340	0.1820	0.1360		
0.5 Live Load	20 psf	0.2414	0.3424	0.2514	0.2594	0.3501	0.2727	0.2480	0.3500	0.2630	2520	21.356
After 5 min. hold		0.2442	0.3441	0.2531	0.2619	0.3515	0.2754	0.2450	0.3520	0.2640		
0.75 Live Load	30 psf	0.3613	0.5024	0.3694	0.3858	0.5235	0.4061	0.3750	0.5320	0.3970	3780	32.034
After 5 min. hold		0.3648	0.5053	0.3712	0.3878	0.5239	0.4086	0.3770	0.5350	0.3980		
Live Load	40 psf	0.4917	0.6762	0.4986	0.5187	0.6987	0.5399	0.4920	0.6950	0.5160	4830	40.932
After 5 min. hold		0.4973	0.6840	0.5047	0.5234	0.7022	0.5448	0.4950	0.6990	0.5170		
Load Removed	Zero Load	0.0530	0.0490	0.0434	0.0131	0.0341	0.0337	0.0170	0.0290	0.0180	0	0
After 5 min. hold		0.0342	0.0490	0.0414	0.0123	0.0328	0.0329	0.0150	0.0290	0.0170		
Live Load	40 psf	0.5174	0.6761	0.5086	0.5294	0.7138	0.5506	0.5000	0.7170	0.5050	4830	40.932
After 5 min. hold		0.5183	0.6770	0.5095	0.5303	0.7149	0.5513	0.5020	0.7200	0.5070		
1.50 Live Load	60 psf	0.7678	0.9551	0.7634	0.7861	1.0518	0.8132	0.7320	1.0340	0.7370	7350	62.288
After 5 min. hold		0.7757	0.9636	0.7757	0.7939	1.0619	0.8225	0.7390	1.0430	0.7420		

Mode of Failure:

One web 20" from one end (the full web end) on one outer truss started to deform and buckle when an evenly distributed load of 120 pcs. was applied. i.e 8400 lbs or 71.186 psf.

A second web 39" from the same end (the full web end) on the same outer truss started to deform and buckle when an evenly distributed load of 126 pcs. was applied i.e. 8820 lbs. or 74.746 psf. The test was concluded at this point.

PRELIMINARY



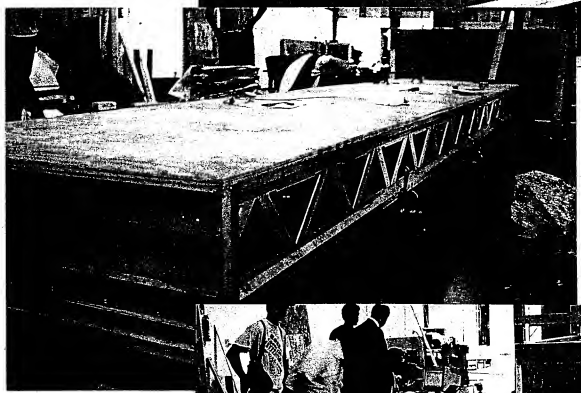


EXHIBIT 26

GOUVIS ENGINEERING

Sht 1
J.N. G-12250
Date 7/96
Client METER

20 GA TRUSS

SPAN = 17'-3"

DL = 10 PSF
LL = 40 PSF
SPACING = 24" O/C

TOP CHORD : $M = .0551$ 'k
$P = 4.335^k$
$P_{ALL} = 4.37^k > 4.335^k$ ok!

BOT. CHORD: $M = 0.0468$ 'k
$T = 4.365^k$
$T_{ALL} = 5.9^k > 4.365^k$ ok!

WEB (AT WEAKEST SECTION)

$P_{MAX} = 1.2^k$
$P_{ALL} = 1.5^k > P_{MAX}$ ok!

$\Delta_{TL} = .579" = \frac{L}{358} > \frac{L}{240}$ ok!

$\Delta_{LL} = .463" = \frac{L}{447} > \frac{L}{360}$ ok!

GOUVIS ENGINEERING

Sht 2
J.N. G-12250
Date 7/96
Client METER

18 GA TRUSS

SPAN = 20'-3"

DL = 10 PSF
LL = 40 PSF
SPACING = 24" O/C

TOP CHORD: M = .0706 'K
P = 5.97 K
P_{ALL} = 6.05 K > 5.97 K OK!

BOT. CHORD: OK PER INSP.

WEB:

P_{MAX} = 1.75 K

P_{ALL} = 2.1 K > 1.75 K OK!

$\Delta_{TL} = .826" = \frac{L}{294} < \frac{L}{240}$ OK!

$\Delta_{LL} = .661" = \frac{L}{367} < \frac{L}{360}$ OK!

GOUVIS ENGINEERING

Sht 3
J.N. G-12250
Date
Client

20 GA TRUSS

SPACING = 12" O/C

1)

$$\frac{(40)\ L^4}{(80)(17.25)^4} = \frac{(L/360)(12)}{.463}$$

$L = 23.36'$ → GO VERNS

2)

$$\frac{50\,(L)^2}{100\,(17.25)^2} = \frac{4.37}{4.34}$$

$L = 24.48'$

3)

$$\frac{\frac{1}{2}(50)(L)}{\frac{1}{2}(100)(17.25)} = 1$$

$L = 34.5'$

$L_{ALLOW} = 23'-4"$

GOUVIS ENGINEERING

Sht 4
J.N. G-12250
Date
Client

20 GA TRUSS

SPACING = 16" O/C

1) $L = \sqrt[3]{\frac{80}{53.3}(6374.6)} = 21.23'$ ← GOVERNS

2) $L = \sqrt{\frac{100}{66.7}(299.6)} = 21.0'$

3) $L = \frac{100}{66.7}(17.25) = 25.9'$

$L_{ALLOW} = 21'-4"$

GOUVIS ENGINEERING

Sht 5
J.N. G- 12250
Date
Client

20 GA TRUSS

19.2" O/C

1) $L = \sqrt[3]{\frac{1}{18}(6374.6)} = 20.0'$

2) $L = \sqrt{(1.25)(299.6)} = 19.35'$ ← GOVERNS

3) $L = (1.25)(17.25) = 21.56'$

$L_{ALLOW} = 19'-3"$

GOUVIS ENGINEERING

Sht 6
J.N. G. 12250
Date
Client

18 GA TRUSS

SPACING = 12" O/C

1)

$$L = \sqrt[3]{2(8479.6)} = 25.69' \leftarrow \text{GOVERNS}$$

2)

$$\frac{(L)^2}{2(20.25)^2} = \frac{6.05}{5.97}$$

$$L = \sqrt{(2)(415.6)} = 28.83'$$

3)

$$L = (2)(20.25) = 40.50'$$

$$L_{ALLOW} = 25'-8"$$

GOUVIS ENGINEERING

Sht 7
J.N. G-12250
Date
Client

18 GA TRUSS

SPACING = 16" O/C

1) $L = \sqrt[3]{1.5(3479.6)} = 23.34'$ ← GOVERNS

2) $L = \sqrt{1.5(415.6)} = 24.97'$

3) $L = 1.5(20.25) = 30.38'$

$L_{ALLOW} = 23'-4"$

GOUVIS ENGINEERING

Sht 8
J.N. G-12250
Date
Client

18 GA TRUSS

19.2" O/C

1) $L = \sqrt[3]{1.25(8479.6)} = 21.97'$ ← GOVERNS

2) $L = \sqrt{1.25(415.6)} = 22.79'$

3) $L = 1.25(20.25) = 25.3'$

$L_{ALLOW} = 22'-0"$

EXHIBIT 27

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 08/06/96
Ref#: 28446

Mach: 100194

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED
WARCO MOMDEL #SC2-200-54-54E STRAIGHT SIDE DOUBLE CRANK PRESS

Rated capacity	200 tons
Stroke of Slide	6"
Slide Adjustment	6" (Power)
Shut Height	20" SDAU
Strokes Per Minute	33 to 70
Area of Bed	54-1/2" x 54"
Area of Slide	54" x 54" T-Slot
Windows	38-3/4" x 10-3/4"
Bosltер	54" x 54" x 6" (T-slot)

EQUIPPED WITH:

Air Clutch
Air Counter Balance
40 HP Main Motor

Overall Dimensions: 9' x 10' x 15'6"
Weight: 52,000 #

PRICE: $69,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodspeed

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 08/06/96
Ref#: 28445

Mach: 101655

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED
BLISS MODEL #S2-150-60-36 2-POINT STRAIGHT SIDE DOUBLE CRANK PRESS

TIE ROD FRAME ------ SINGLE BACK GEARED

Rated Capacity	150 Tons
Stroke of slide	10"
Shutheight	23-1/2"
Ram Adjustment	8"
Ram Area (l-r x f-b)	60" x 36"
Ram Plate (l-r x f-b x h)	60" x 36" x 4"H T-Slotted
Bolster (l-r x f-b x h)	60" x 36" x 2-1/2"
Side Frame Opening (l-r x high)	19" x 15"
Strokes per Minute	35
Width between Uprights	66"

Air Clutch on Flywheel	(2) Air Cushions 2,5 tons w/5" travel
15 HP 3/220-440/60 Motor	Air Counterbalance
Flywheel V-Belt	Palm Button Controls
One-Shot Lubrication System	Motor mounted on top

PRICE: $49,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodspeed

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 08/06/96
Ref#: 28444

Mach: 57716

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED
BLISS MODEL #6-60W STRAIGHT SIDE DOUBLE CRANK TIE ROD DESIGN PRESS

RATED CAPACITY.....135 TONS
GEARED.....DOUBLE BACK
STROKE OF SLIDE.....8"
SHUTHEIGHT.....18-1/2"
ADJUSTMENT.....3"
BED AREA.....60" L-R X 42" F-B
RAM AREA.....54-1/2" L-R X 34" F-B
BOLSTER AREA.....60" L-R X 42" F-B X 4-1/2" H
SIDE FRAME OPENINGS.....12" L-R X 10" H
DISTANCE BETWEEN UPRIGHTS.....61"
SHAFT.....5-3/4"
SPEEDS: STROKES PER MINUTE.....20

EQUIPPED WITH:

AIR CLUTCH
TWIN END DRIVE
FLYWHEEL "V" BELT
AIR COUNTERBALANCE TO RAM
AIR CUSHION IN BED MARQUETTE TYPE 18" DIAMETER X 6" STROKE
POWER RAM ADJUSTMENT
15 HP 3/60/220-440 (1755 RPM) MOTOR

PRICE: $24,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Woodyard

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 08/06/96
Ref#: 28442

Mach: 58335

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED
BLISS-TOLEDO MODEL #93-1/2 STRAIGHT SIDE DOUBLE CRANK PRESS

RATED CAPACITY (TONS)	126
GEARED	SINGLE BACK
STROKE OF SLIDE	10"
SHUTHEIGHT	30"
BOLSTER	4"
RAM ADJUSTMENT	3-1/2"
WINDOWS (L-R X HIGH)	12" X 15"
SPEEDS: STROKES PER MINUTE	32
BED AREA (L-R X F-B)	67" X 36"
RAM AREA (L-R X F-B)	60" X 25"

EQUIPPED WITH:

AIR CLUTCH
AIR COUNTERBALANCE TO RAM
ONE SHOT LUBE SYSTEM
TWIN END DRIVE
AC MOTOR AND CONTROLS

PRICE: $17,000.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodspeed

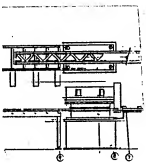
EXHIBIT 28

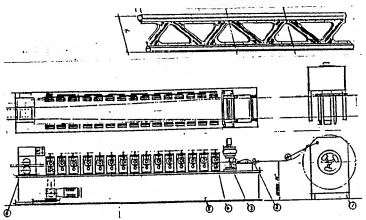
ENGINEERING, INC.
2697 S. Halladay St., Santa Ana, CA 92705
(714) 979-5940 • FAX (714) 979-1617

TONY LUCAS
979-7080

Qty.	Name of Part	Due:	Date:
1-LINE	12 × 1½ STRUCTURAL JOIST	APPX 26 WKS.	8-19-96
		Tax: ☒ YES ☐ NO	Person: MR. DARRELL MEYER
Part #	Process		Phone: (714) 361 9295
	SPEC. MACHINE		FAX: (") 285 1004
Mat. STEEL: 18 + 20 GA. × 21.5" × COIL			P.O.#:

Customer: TRUS STEEL



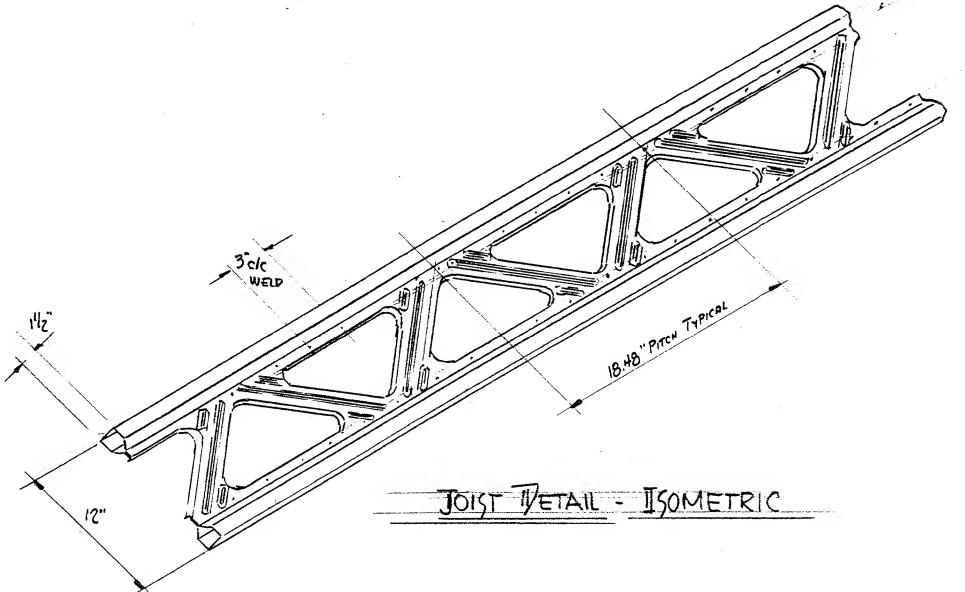


1. UNCOILER: 20,000 lbs. HYDR. + MOTORIZED
2. HUMPTABLE + PINCH STATION
3. PREPUNCH PRESS
   — " — CUT OFF SHEAR
4. FORM ROLLS: HT. TR.
5. ROLL FORMER: 2×24 – 15
6. WELD STATION: (ROTARY)
7. FEED STATION (SPECIAL)
8. PUNCH PRESS:
   PROGRESSIVE DIE: (PIERCE + FORM)
9. RUNOUT TABLE (40 FT lg.)
   PACKAGING (SIDE STEPPING)
10. ENGINEERING + DEBUGGING

NOTES: 1. CUSTOMER TO SUPPLY ALL TRYOUT MATLS.
2. TERMS: ⅓ DOWN WITH P.O.
⅓ AFTER 6 WKS
BAL. UPON COMPL. AND ACCEPTANCE IN OUR PLANT.

TOTAL 493,100.-

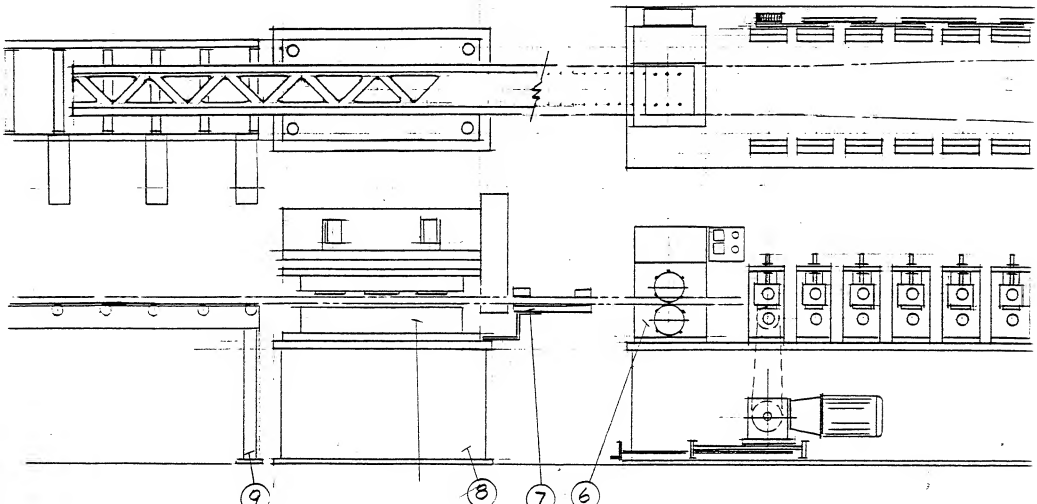
F.O.B. OUR PLANT SANTA ANA, CA.



JOIST DETAIL - ISOMETRIC

AL ENGINEERING, INC.
2697 So. Halladay St.
Santa Ana, CA 92705
(714) 979-5940

8-19-96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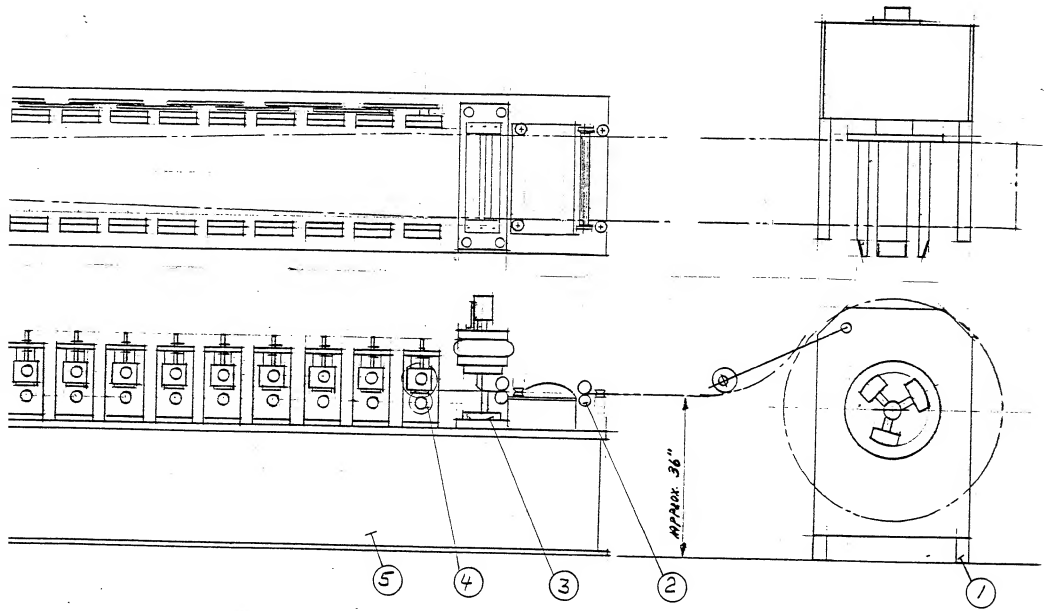
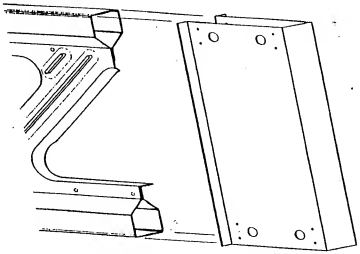


AL ENGINEERING, INC.
2697 So. Halladay St.
Santa Ana, CA 92705
(714) 979-5940

ENGINEERING, INC.

2697 S. Halladay St., Santa Ana, CA 92705
(714) 979-5940 • FAX (714) 979-1617

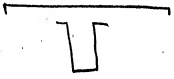
Qty.	Name of Part	Due:	Date:	Customer:
1	TOOLING FOR: "TRUSS ENDS"	8 WKS	8-19-96	TRUS STEEL
		Tax: ☒ YES ☐ NO	Person: ATT. DARRELL MEYER	
Part #	Process		Phone: (714) 3619295	
	TOOLING		FAX: " 2851004	
Mat.			P.O.#:	



1. TO DIE DESIGN:

a. BLANK DIE. (PIERCE + CUTOFF) — 4,500 —

b. DBL. FORM DIE. — 3,500 —



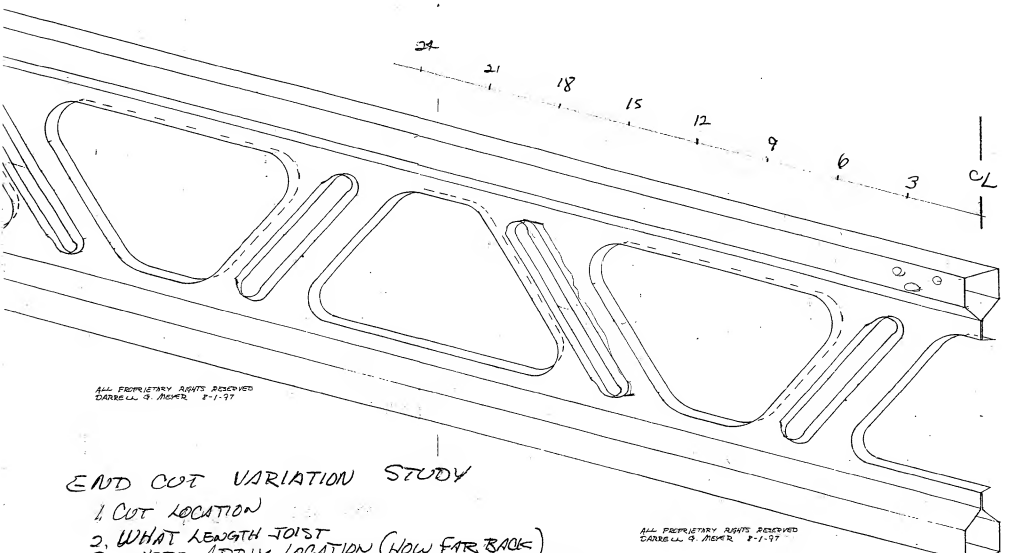
NOTES:

TOTAL 8,000.-

F.O.B.

EXHIBIT 29

NOTE! REVERSING FLANGE DIRECTION — "TOO COMPLEX IN DIE DESIGN"



END CUT VARIATION STUDY

1. CUT LOCATION
2. WHAT LENGTH JOIST
3. WHERE APPLY LOCATION (HOW FAR BACK)
4. USE END CAP W/ SAME 3 SCREW PATTERN

SteelIJoist

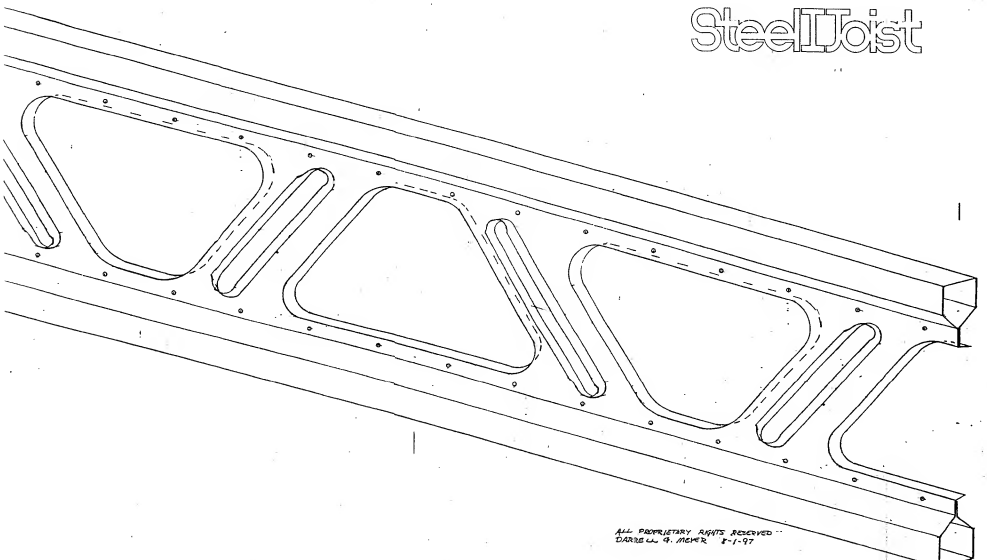


EXHIBIT 30

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 01/07/98
Ref#: 41392

Mach: 101816

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED

YODER 15 STAND ROLL FORMER

ARBOR DIAMETER ..... 2-1/2"
MAXIMUM WIDTH BETWEEN HOUSINGS ..... 27-1/2"
HORIZONTAL DISTANCE BETWEEN CENTERS ..... 20-1/2"
MAXIMUM VERTICAL DISTANCE BETWEEN CENTERS ..... 10.8"

EQUIPPED WITH: ADJUSTABLE ENTRY EDGE GUIDE SIDE PLATES MOUNTED ON IDLER ROLL STAND
EDGE GUIDE ROLL STAND ADJUSTED VIA HAND CRANK SCREW
OUTBOARD HOUSING BASES BOLTED TO T-SLOTS IN MACHINE BED TO HOLD THEM INTO POSITION
DIRECTION OF FLOW: LEFT TO RIGHT
40 KW 3/230-380/50 (1450 RPM) 133/77 AMP MOTOR
ELECTRIC BRAKE

PRICE: $62,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodspeed

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 01/07/98
Ref#: 41391

Mach: 102512

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED

LOCKFORMER 12 STAND ROLL FORMER

ARBOR DIAMETER	3"
HORIZONTAL CENTERLINE DISTANCE	20"
VERTICAL CENTERLINE DISTANCE	7" MINIMUM
	10-1/2"
DISTANCE BETWEEN HOUSINGS	30"
O.A. DIMENSIONS	24"3" LR X 5'7" FB X 4'11" HIGH

EQUIPPED WITH:
RIGHT TO LEFT ENTRY FLOW
ENTRY EDGE GUIDE
MOTOR

PRICE: $42,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodyear

QUOTATION

Tel: (310) 949-2446
Toll Free: 800-282-6285
FAX: (310) 942-0624

National Machinery Exchange, Inc.

Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Darryl Meyer
TRUSTEEL MFG.
18 Vista Encante
San Clemente CA 92672

Date: 01/07/98
Ref#: 41390

Mach: 103332

Tel : 714-285-1004
FAX : 714-285-1369

We are pleased to offer the following for your consideration:

ONE (1) USED

McKAY 10 STAND ROLL FORMER

Shaft diameter	3"
Roll space	16"
Horizontal centers	17"
Vertical adjustment	6"
Horsepower gear drive	40

PRICE: $72,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

Bob Goodgame

AMERICAN
MACHINE & ROLLFORM TECH, INC.

January 8, 1998

Mr. Darrell Meyer
Steelworks
1801 Parkcourt Building E 200
Santa Ana, CA 92701

Dear Mr. Meyer,

The first to build a fast and reliable flying hydraulic punch and cutoff; American Machine & Rollform Tech, Inc. has continued to be an innovator in hydraulic technology in the rollforming industry for over 15 years. In line with that progress we are ready to introduce into the market place our complete rollforming system to include the high performance American Machine rollformer.

While the "flying" press allows you to maintain a constant line speed without stopping to punch or cut your product, the rollformer with its double enveloping worm and worm gear provides high shock resistance for heavy load starting and stopping. By providing extra torque capacity, low backlash, and increased durability, this design will provide more years of higher productivity than straight worm gear designs.

One of the key reasons American Machine has been a leader in the rollform industry is your production output will remain consistent, precise, and predictable, delivering line speeds in excess of 300 FPM. As part of The Bradbury Group of companies we offer you our specific and unique set of technical skills and experience along with the united capabilities of all our companies within the group.
We obviously want an opportunity to earn your business and trust that you will consider us as a serious and viable option for future equipment needs. I look forward to talking with you regarding our equipment specifications.

Sincerely,

Rob Booth

Robert P. Booth
Sales Coordinator

Enclosures

AMERICAN
MACHINE & ROLLFORM TECH, INC.

J. B. Leahy
@ ATLANTA

2771 Pence Loop SE
Salem OR 97302
503-588-2638 Fax 503-588-4029
E-mail: jbleah@americanmachine.com

THE BRADBURY GROUP

SteelWerks

1801 E. Parkcourt Place
Building E, Suite 200
Santa Ana, CA 92701
(714) 285-1004
Fax (714) 285-1369

March 25, 1998

Mr. Robert Booth
American Machine & Roll Form
2771 Pence Loop SE
Salem, OR 97302

Re: Steel I Joist

Dear Robert,

The Steel I Joist manufacturing line should incorporate these general specifications for the product with your expertise leading the way to determine the most efficient way to achieve our goals.

SPECIFICATIONS:

- Finished Dimensions - 12" High and 1 1/2" Wide
- Steel Grade 50 KSI (+) Zincalume
- Both 18 Gauge and 20 Gauge capacity
- Material width 20.5" (Plus or Minus)
- Pentagon Shaped Chord Sections
- Mechanical Clinch-Fasten to close Chords
- 12" center to center dimension of openings in triangle
- Bend flanges to achieve stiffness in center section - Continuous
- Bend flanges in reverse in slots (If possible)

The roll form line and ancillary stations may be positioned to achieve the following objectives:

- Continuous lengths to 40 feet
- Cut to order increments of 1 foot
- "Factory" end / start of stamped openings
- Mechanical Clinch-Fastener to close Chords may be Wheel Type (Hill Mfg. or Eckold) or Flying Tog-L-Loc (BTM)

- Roll-Form Line probable specs:
  a. 2 1/2" diameter shafts
  b. 24" stand clearance
  c. 14 - 16 stands
- Uncoiler
  a. Single w rail
  b. Double
- Welder - Coil Ends
- Stacker - Accumulator
- On-Line stamp openings / Form flange hydraulic
- "Alternative" Off-Line stamp / Flange separate feed - Progressive punch and die

Decisions on machinery locations to best complete the following steps:

- Cut to Length - 1 foot increments
  a. Prior to entry
  b. Shear outer 1/3 each side prior to entry, center section after pentagon - Flying cut-off
  c. After forming and clinching
- Punch triangular opening
- Punch or shear diagonal slots
- Form flanges - Triangle
- Form flanges - Slot

I look forward to your recommendations, proposal and a long relationship.

Sincerely,
Steelworks

Darrell G. Meyer

DGM/lw

EXHIBIT 33

SteelWerks

1801 E. Parkcourt Place
Building E, Suite 200
Santa Ana, CA 92701
(714) 285-1004
Fax (714) 285-1369

April 6, 1998

Mr. Al Strecker, Sales Manager
The Bradbury Company
Air Industrial Park
Moundridge, KS 67107

RE: Steel I Joist Rollform Line

Dear Mr. Strecker,

Per our conversation of Friday, April 3, 1998, I enclose preliminary drawing for the manufacture or a residential floor joist. These are the same drawings furnished to Mr. Dan Lovelace and Mr. Robert Booth at our meeting in their offices March, 25, wherein we discussed various methods of production leading to a proposal to build a Rollform Line.

We recognize you as the experts in roll form design, but several options arise as where to best perform functions such as:

- Cut to length
- Cut openings and slot
- Bend flanges, preferably up and down
  a) On line, after closure, on fly
  b) Off line, progressive punch and die
- Handling of product flow after roll form (under either condition)

I also enclose a Non-Disclosure Agreement, the execution of which I would appreciate. I hereby acknowledge assurance to you of mutual confidentiality on potential concepts developed for fabrication of this product.

My original design was discussed with Richard Pearson in 1996 and Bradbury generated a proposal. Further engineering and subsequent prototype tests, meetings with I. C. B. O. (International Congress of Building Officials) and concerns about resistance spot welding have led to the current design and specifications.

RDB -TNX
503 588-4029
TNX 4-9 2100

Mechanically fastening/closing of the pentagon shaped chords on the roll form line with a system that maintains consistent quality that can be monitored and inspected is a prime concern. Two companies have the experience and capability to provide a rotary unit, Hill Engineering and Eckold. Dan and Rob suggested I correspond further with Thomas Grossman and I enclose a copy of my letter to him.

We would welcome your critique of the joist and the best way to manufacture same. I want to be able to obtain an I.C.B.O. number which establishes engineering performance standards that are uniformally recognized. Hopefully, we will do it so well, we will stifle potential knock-offs.

Multiple plants or licensing arrangements are the long range goal with the original plant to be operated here is southern California.

I thank you, Dan and Bob for an opportunity to meet in person at your factory, introducing the H L stud line. I have scheduled a flight and plan to be in your facility Wednesday, April 22, 1998, at 8:30 AM.

I look forward to your initial comments following receipt of this package, developing the system and, of course, meeting all of you on the 22nd.

Respectfully,

Steelworks

Darrell G. Meyer

DGM/lsw

Enclosures

cc: Dan Lovelace, Robert Booth
American Machine

EXHIBIT 34

SteelWerks

1801 E. Parkcourt Place
Building E, Suite 200
Santa Ana, CA 92701
(714) 285-1004
Fax (714) 285-1369

April 6, 1998

Mr. Thomas Grossman
Eckold A G
CH - 7203 Trimmis
Schweiz, Switzerland

RE: Steel I Joist / Mechanical Joining

Dear Mr. Grossman,

In Atlanta, this past October, we discussed the feasibility of your firm providing a Rotary / Wheel Clinching Machine to be installed on a Roll Form line.

Enclosed is a preliminary drawing showing the cross section of our floor joist, 12" x 1 1/2" with basic specifications.

I am working with American Machine and Bradbury Company on the complete Roll Form Line. Their addresses and phone numbers are listed below.

The fastening system must be able to meet certain engineered load standards to ultimately satisfy I. C. B. O. (International Congress of Building Officials) and allow some method of periodic sampling and inspection.

Multiple plants or licensing arrangements are the long range goal with the original line to be operated here in southern California.

As soon as possible, review our request and advise feasibility, general configuration and dimensions.

I welcome your comments and also feel free to contact the aforementioned companies on the team. Your confidentiality is appreciated.

Steelworks

Darrell G. Meyer

DGM/lw
Enclosures
cc: Craig Leber, USA Agent

FAXED
4-13-98
9:15

EXHIBIT 35

SIM-VISION

Tel: (416) 264-5790
Fax:(416)264-5632

3233 Eglinton Avenue East.Suite 1109 Toronto, Ontario M1J 3N6

Mr. Meyer

Following is a quotation for an uncoiler for your new roll forming project.

I have built many uncoilers for Kent Corporation in the past and now have an agreement to build both Kent's uncoiler as well as my own design which Kent will often purchase when their own design is oversized for a certain application. In this case I have spoken with Mark Costello at Kent Corporation and he had mentioned that he quoted an uncoiler and coil end welder for your new roll form project with American Machine.

Mark has said that you may buy the entry and coil handing equipment separate to save a little money. Mark also agrees that his uncoiler that he quoted may be way oversized for this application. Kent's uncoilers are for filling into high speed accumulators for the tube mill industry and can handle speed up to 1,800 feet per minute. The uncoiler I have quoted can also be used for accumulators and with the proper brake can handle 1,000 feet per minute. However, by buying direct from Sim-Vision you can save money. We have an excellent exchange rate for US currency and, therefore, we can offer an excellent product at a very competitive price. Please see the quotation.

Kent Corporation has supplied coil end welders to me in the past for entry lines I have built at previous companies. Kent offers the best coil end welding products available. We have had little to no service required in the years I have purchased their products.

I hope we can all work together on this project and many others in the future. I am sure you will be more than happy with our equipment.

Note: We can also quote the straightener and incorporate the Kent coil end welder into our entry at no additional cost. Please call if interested.

Yours very truly,

Kevin Simpson
President

SIM-VISION

Tel: (416) 264-5790
Fax:(416)264-5632

3233 Eglinton Avenue East, Suite 109 Toronto, Ontario M1J 3N6

QUOTATION NO. 126-98

April 17, 1998

Mr. Darrell Meyer
TRUSSTEEL
3822 East La Palma Ave.
Anaheim, CA. 92807
Fax: (714) 630-0880
Phone: (714) 630-9620

SUBJECT: 10,000 lb. HYDRAULIC DOUBLE UNCOILER

Dear Darrell,
We are pleased to offer the following

ITEM #1 10,000 LBS HYDRAULIC DOUBLE UNCOILER

MODEL # 10K-D-HYD
AS PER SPECIFICATION SHEET #11050

PRICE $ 38,950.00

OPTIONAL

SHOCK ABSORBERS

PRICE $ 2,600.00

NOT INCLUDING :

SHIPPING, INSTALLATION
MACHINE AND ELECTRICAL GUARDING
SET-UP AND ELECTRICAL INTERGRATION

Prices are quoted in US $ dollars

The attached Condition of Sale Bulletin #5000 form is a part of our proposal

F.O.B.:
SIM-VISION, Toronto, Ontario

Terms and Condition
25% Downpayment with P.O.
25% After engineering approval
25% Upon 50% completion
15% Before shipping
10% Net 30 days

Delivery
Based on today's workload is approx. 14-16 weeks.

This quotation is valid for 60 days
Looking forward to hearing from you.

Yours very truly,

Kevin Simpson
President

SIM-VISION

Tel: (416) 264-5790
Fax:(416)264-5632

3233 Eglinton Avenue East,Suite 1109 Toronto, Ontario M1J 3N6

UNCOILER

SPECIFICATION SHEET # 11050
6000 LB. DOUBLE

Model	-	10K-D-HYD
Number of Mandrels	-	2
Capacity	-	10,000LBS/SIDE
Maximum Outside Diameter	-	60"
Maximum Width	-	24"
Inside Diameter Expansion	-	17 ½" - 20 ½"
Expansion Type	-	WEDGE
Expansion Power	-	MANUAL
Number of Drum Segments	-	4
Rotation	-	MANUAL
Rotation Locking	-	HYD WEDGE TYPE
Hand of Operation	-	T.B.A.
Power Supply (Control)	-	T.B.A.
Loading Method	-	C HOOK / LIFT TRUCK
Colour	-	T.B.A.
Brake	-	AIR DRAG 250 FPM MAX
Feed-Up Drive	-	NOT REQUIRED
Hold-Down Roll	-	NOT REQUIRED

SIM-VISION UNCOILERS

Standard Features

- 3000 lb. uncoilers have a link type mandrel
- 6000 lb. and 10000 lb. uncoilers have a wedge type mandrel
- Maximum air pressure required is 80 p.s.i.
- Pneumatic disc brake with air regulator
- (2) two coil keepers per mandrel
- Manual expansion, with (1) one adjusting wrench
- 60" full diameter backing plate
- (4) four leaf mandrels
- 3" sub-base on all double mandrel uncoilers
- Heavy duty, all steel welded construction
- Timken bearings
- Solid wedge locking on double uncoilers
- Standard colour are sky blue and safety orange
- 3 h.p. hydraulic unit with all hydraulic expansion uncoilers (max. 800 psi)
- Individual electrics (stand alone operating uncoilers)

Options

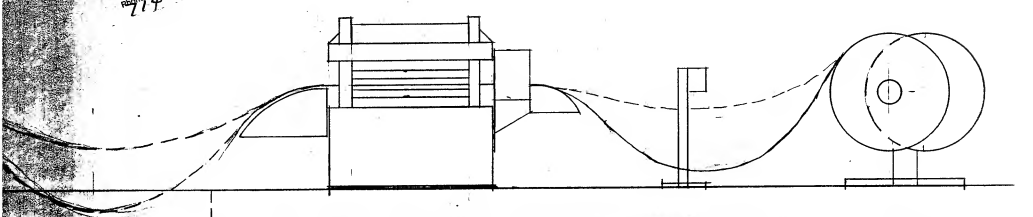
- 12" powered sideways travel
- 72" full backing plates
- Non-powered pneumatic hold-down (free wheel only)
- Hydraulic hold-down free wheel only (top of uncoiler / floor mounted)
- Hydraulic hold-down with feed-up roll (top of uncoiler / floor mounted)
- Bolt on pads (four required) (16"-20"-24" inside diameters)
- Outboard coil retainer (60"-72" diameter coils) (hydraulic / electric)
- Electric loop control (driven uncoilers only)
- Over-running clutch (driven uncoilers only)
- 180 degree powered rotation (double uncoiler only)
- Shock absorber (two required) (double uncoiler only)
- High speed package (300-1000 ft/min), oversized air brake, shock absorbers and dual air pressure brake control
- Special colour paint

Driven Uncoiler Options

- Hydraulic feed-up (3-5 fpm)
- Electric feed-up (3-5 fpm)
- Hydraulic full time drive (0-100 fpm)
- A.C.-V.F. full time drive (0-100 fpm)
- D.C. full time drive (0-100 fpm)
- Jog forward and jog reverse controls
- Electrical control pendent

EXHIBIT 36

Postit Fax Note
To DAN
From DARROLL
Date 6-4
# of pages
Fax 503 588-4029
Phone 714 441-0497



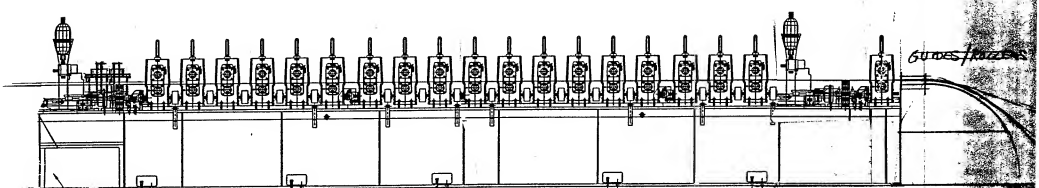
150 TON PRESS
PUNCH & FLANGE

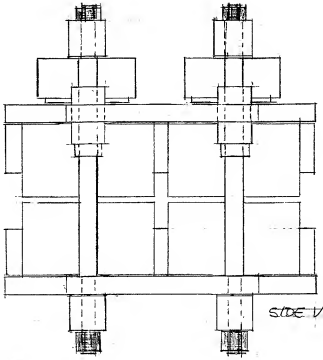
ROLL FEED
RAPID-AIR

LOOP CONTROL
RAPID-AIR

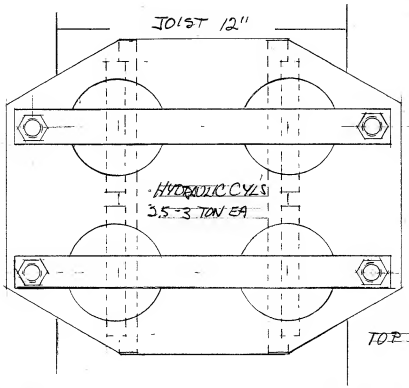
DUAL UNCOILER
POWER FEED CONTROLED
BY LOOP CONTROL

PROGRESSIVE FEED @ 2 FT / 2 SEC


GUIDES/FEEDER
FLYING /MECH FASTENER
1 FT / 1 SEC
ROLL FORMER
18 STANDS @ 18'6/C
FLYING CUT-OFF
FEED/START
SPEED/ 1 FT/SEC 60 FT/MIN



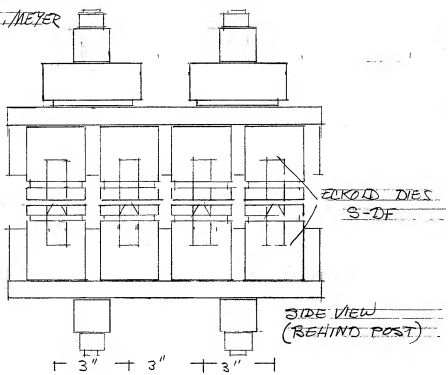
SIDE VIEW



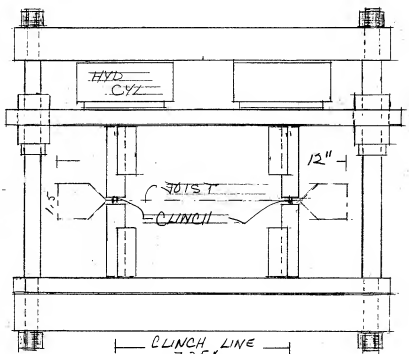
TOP VIEW

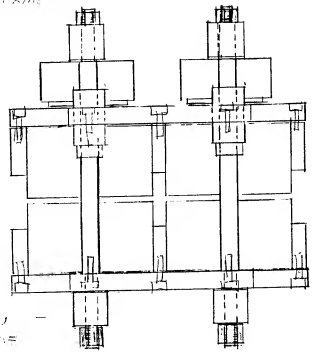
1/4 SCALE

DARRELL G. MEYER

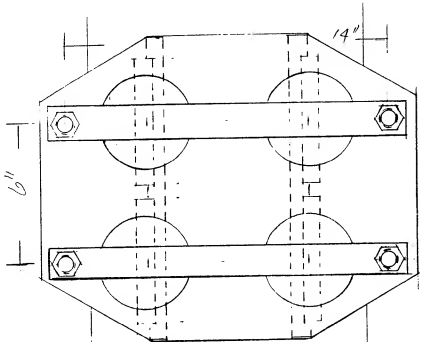


SIDE VIEW
(BEHIND POST)

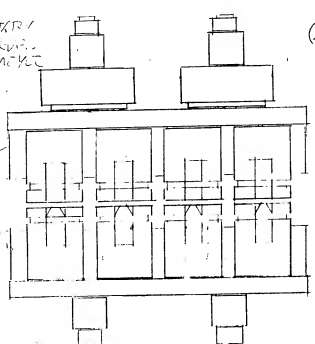


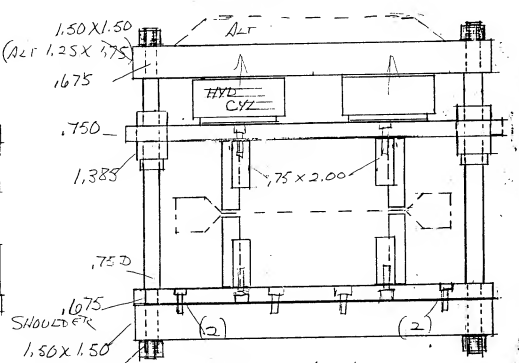


SIDE VIEW



TOP VIEW





FRONT VIEW

EXHIBIT 37

QUOTATION

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Tel: (562) 949-2446
Toll Free: 800-282-6285
FAX: (562) 942-0624
E-mail: nmachine@aimcomm.com

Darrell Meyer
STEEL WORKS
3822 East La Palma
Anaheim CA 92807

Date: 07/13/98
Ref#: 47236

Mach: 103754

Tel : 714-441-0447
FAX : 714-441-0947

We are pleased to offer the following for your consideration:

ONE (1) USED

18 STAND, YODER #M2-1/2 ROLL FORMER

SPECIFICATIONS:-

Previously used for construction panels

Hand of Operation: Left to Right
Shaft Diameter: 3.250"
Keyway: 3/4" W x 9/16" Thick
Roll Space: 38"

Vertical Centers, (Manual Individual Micrometer Adjustment):
5-3/4" to 9"

Horizontal Centers: 18"
Base to Center Line of Bottom Shaft: 8-1/2"
Pass-Line: 38" - Approximate
Equal Geared

EQUIPPED WITH:-

Push-Button Console and Controls
(1) Box of Miscellaneous Tooling (List Available Upon Request)
Currently Tooled for Construction Paneling

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.

QUOTATION

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Tel: (562) 949-2446
Toll Free: 800-282-6285
FAX: (562) 942-0624
E-mail: nmachine@aimcomm.com

Darrell Meyer
STEEL WORKS
3822 East La Palma
Anaheim CA 92807

Date: 07/13/98
Ref#: 47236

Mach: 103754

Tel : 714-441-0447
FAX : 714-441-0947

PAGE 2

MOTOR DATA:-

40 HP, G.E., 550, 1775 RPM
1 HP Boston, 575/1725 RPM

OVERALL DIMENSIONS:- 8'W x 33'6"L x 6'6"H
WEIGHT:- 38,550# Approximate

CONDITION:- Excellent

*** PHOTOS AVAILABLE ***

PRICE: $89,500.00

"If It's Machinery, We Have It!"

National Machinery Exchange, Inc.
Bob Goodspeed

QUOTATION

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Tel: (562) 949-2446
Toll Free: 800-282-6285
FAX: (562) 942-0624
E-mail: nmachine@aimcomm.com

Darrell Meyer
STEEL WORKS
3822 East La Palma
Anaheim CA 92807

Date: 07/13/98
Ref#: 47234

Mach: 102129

Tel : 714-441-0447
FAX : 714-441-0947

We are pleased to offer the following for your consideration:

ONE (1) USED

YODER 11 STAND ROLL FORMER

11 Stands on a 12 Stand Base
Unequal Gearing: Gear Driven
Outboard Type - Right to Left Feed

Shaft Diameter	3"
Spindle Key Size	3/4"
Roll Space	30"
Roll Diameter	10" Maximum
Vertical Centers	5" to 10"
Horizontal Centers	18"
Center of Lower Roll to Base	8.5"
Height of Base	24"
Speed (Approx.)	75 FPM
Coolant Pump & Motor	230/460/3/60
Main Motor	50 HP 870 RPM 550/3/60

Equipped with:

Powered Entry Rolls
Powered Exit Rolls
Entry Guide & Exit Guide
Micrometer Screw - Vertical Adjustment
In-Base Coolant Reservoir
Individual Coolant Nozzles
Gusher 1/2 HP 3450 RPM

Weight (approx.) 20,000 Lbs.
Overall Dim. <est> 285" l-r x 77" f-b x 57

PRICE: $54,500.00

National Machinery Exchange, Inc.

Bob Goodspeed / KH

QUOTATION

National Machinery Exchange, Inc.
Wire and Metal Working Machinery
WEST COAST DIVISION
7805 Paramount Blvd., Pico Rivera, CA 90660 (USA)

Tel: (562) 949-2446
Toll Free: 800-282-6285
FAX: (562) 942-0624
E-mail: nmachine@aimcomm.com

800 631-4470
BOB DWYER

Darrell Meyer
STEEL WORKS
3822 East La Palma
Anaheim CA 92807

Date: 07/13/98
Ref#: 47235

Mach: 101816

Tel : 714-441-0447
FAX : 714-441-0947

We are pleased to offer the following for your consideration:

ONE (1) USED

YODER 15 STAND ROLL FORMER

ARBOR DIAMETER ..... 2-1/2"
MAXIMUM WIDTH BETWEEN HOUSINGS ..... 27-1/2"
HORIZONTAL DISTANCE BETWEEN CENTERS ..... 20-1/2"
MAXIMUM VERTICAL DISTANCE BETWEEN CENTERS ..... 10.8"
MINIMUM VERTICAL DISTANCE BETWEEN CENTERS ..... 6"

EQUIPPED WITH:
- ADJUSTABLE ENTRY EDGE GUIDE SIDE PLATES MOUNTED ON IDLER ROLL STAND
- EDGE GUIDE ROLL STAND ADJUSTED VIA HAND CRANK SCREW
- OUTBOARD HOUSING BASES BOLTED TO T-SLOTS IN MACHINE BED TO HOLD THEM INTO POSITION
- DIRECTION OF FLOW: LEFT TO RIGHT
- 40 KW 3/230-380/50 (1450 RPM) 133/77 AMP MOTOR ELECTRIC BRAKE

PRICE: $59,500.00

SHAFT DR

"If It's Machinery, We Have It!"

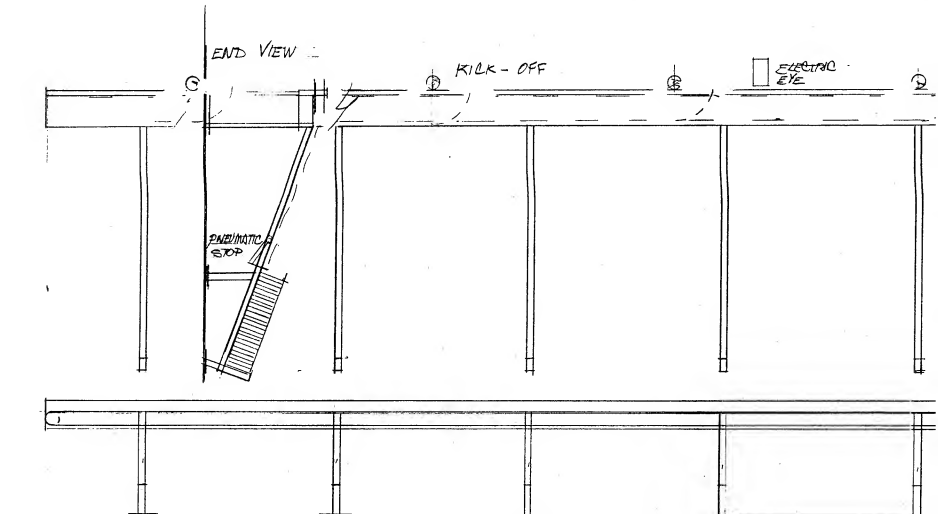
National Machinery Exchange, Inc.

Bob Goodspeed/jf

EXHIBIT 38

123' O/A

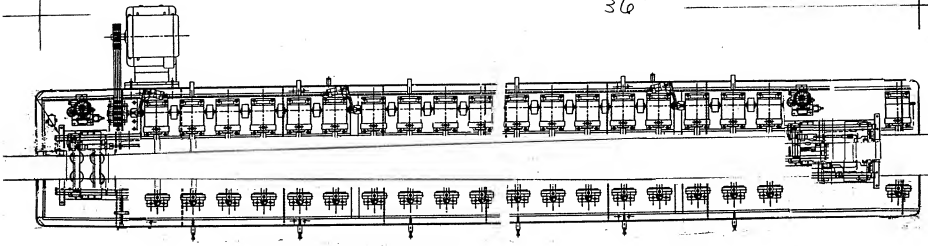
40'

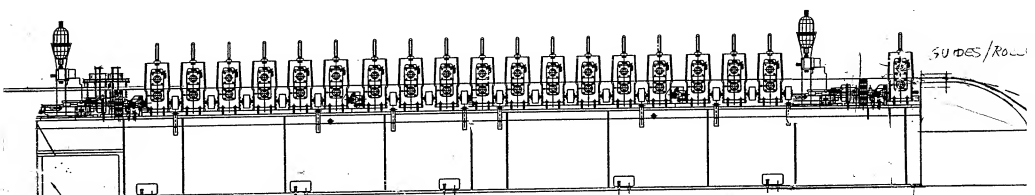


LIVE ROLLER CONVEYOR HYTROL 138 SP

CONVEYOR BELT HYTROL 7A

7 LT INCLINE STACKER-GRAVITY 5-PNEUMATIC STOPS



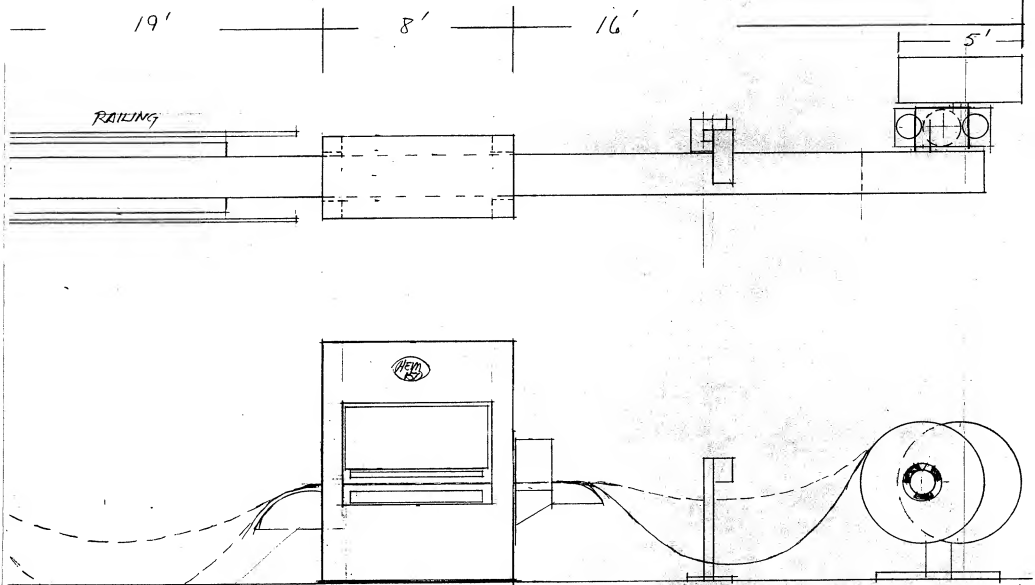


FLYING /MECH FASTENER
1 FT / 1 SEC

ROLL FORMER
18 STANDS @ 18"o/c

FLYING CUT-OFF FEED /START

SPEED/ 1 FT/SEC 60 FT MIN



150 TON PRESS
PUNCH & FLANGE

ROLL FEED
RAPID-AIR

LOOP CONTROL
RAPID AIR

DUAL UNCOILED
POWER FEED CONTROLED
BY LOOP CONTROL

PROGRESSIVE FEED @ 2 FT / 2 SEC

DARRELL G. MEYER 7-20-98
714 441-0947 ANAHEIM, CA

EXHIBIT 20

Sterling

MACHINERY EXCHANGE

THE LATEST IN QUALITY USED FABRICATING & CHIP MAKING MACHINERY • ALL MAJOR BRANDS BUY • SELL • TRADE

CRAFTSMAN DOOR

7/29/98

ATTN: DARREL MEYER

We are pleased to offer the following for your consideration:

ONE (1) USED
17 Stand ARDCOR Model S10-2-1/2-33 Roll Former

SERIAL NUMBER: 90-052
AGE: 1990

SPECIFICATIONS:
17 Stand on 18 Stand Base
Hand of Line: Right to Left
Capacity: .048" or 18 Ga.
Line Speed: 60 FPM (Via Pulley Drives)
Spindle Diameter: 2-1/2"
Roll Space: 33"
Horizontal Distance: 10"
Vertical Adjustment: 4" - 5-1/4"
Base to Centerline of Lower Spindle: 5-3/4"
Passline: 40"
Spindle Gear Ratio: 1:1 (Equal Geared)
Drive Reduction Ratio: 12:1
Key Way Size: 3/8" x 3/16"

EQUIPPED WITH: Individual Gear Box Drives SHAFT
Air Clutch
Micrometer Adjustment on Rolls
(3) Side Pass Guides
Push Button Controls
Electrical Control Panel
Coolant Pump

Motor Data: 40 HP, 220/440/3/60 - 1200 RPM
Overall Size: 17'6" L x 6' W x 52" High
Weight: 18,000 Lbs. Total
Condition: VERY GOOD

Loaded on Truck.....Toledo, (Campbell St. Whse.) OH
**PHOTO & CATALOGUE CUTS AVAILABLE

PRICE: $84,500.00

THANK YOU
RICK KRUGER

Sterling

MACHINERY EXCHANGE

THE LATEST IN QUALITY USED FABRICATING & CHIP MAKING MACHINERY • ALL MAJOR BRANDS BUY • SELL • TRADE

CRAFTSMAN DOOR
ATT'N DARRELL MEYER

7/29/98

OFFER TO SELL

We offer the following subject to the supplemental terms and conditions

17 Stand Yoder Roll Former

Serial No.: 7103-677
Year: 1977

Unequal Geared
36" Roll Space - T-SLOTTED
4" - 8" Vertical Adjustment
15" Horizontal Center Dist.
2 1/2" Spindle Diameter
Speed: 300 FPM
40 HP Drive, 220/440V, 1740 RPM
Air clutch/Brake
Coolant System
10 Spare Shafts

Base dimension: 31" High x 64" Wide x 23' Long

PRICE:..... U.S. $ 99,500.00

THANK-you
Rick KRUGER

Sterling

MACHINERY EXCHANGE

THE LATEST IN QUALITY USED FABRICATING & CHIP MAKING MACHINERY • ALL MAJOR BRANDS BUY • SELL • TRADE

CRAFTSMAN DOOR
ATTN: DARREL MEYER

7/29/98

Gentlemen: We are pleased to offer, subject to prior sale and conditions on back:

**** ONE(1) PRE OWNED PEARSON MODEL 16-2.5-40 ROLL FORMING LINE ****

Serial Number:	R223
Date of Manufacture:	1967
NUMBER OF STANDS:	18
ARBOR (SHAFT) DIAMETER:	2 1/2"
ROLL SPACE:	30"
HORIZONTAL SPACE - C TO C BETWEEN STANDS:	14"
VERTICAL CENTERS:	5" - 7"
SPEED:	25/36/47/57/67/82/86/123 FPM

Equipped with:
****
EQUAL GEARING
REMOTE OPERATOR CONTROLS PENDANT
BASE DRILL AND TAPPED FOR ROLL SPACE ADJUSTMENT ON 8" INCREMENTS
EGAN 20,000# MOTORIZED UNCOILER - HYDRAULIC EXPANSION - 72" OD X 40"
YODER P60 CUT OFF PRESS - 3" STROKE - 32" X 16" BED AREA - AIR CLUTCH
NOTE: MACHINE IN PLANT UNDER POWER UNTIL 31 MAY 1998

MOTOR:	40 HP., 3/60/220-440
Dimensions of Machine:	48'(LR) X 60"(FB) X 72"(H)
Weight:	16000#

Price - FOB Open Top Truck - , PLANT LOCATION $112,500.00

OK ON LINE ONLY

THANK-YOU
RICK KRUGER

Sterling Machinery Exchange
WEB:WWW.sterlingmachineryexch.com
9310 GARVEY AVE
SOUTH EL MONTE, CA 91733

Phone:(626) 444-0311, Fax: (626) 443-9588

BILL

RICK

Machine No: 5915

STERLING MACHINERY EXCHANGE IS PLEASED TO OFFER FOR YOUR CONSIDERATION:

ONE Preowned HEIM STRAIGHT SIDE PRESS
MODEL S150, SERIAL NO 1740 1976

CAPACITY: 150 TON X 4 IN
STROKE ..... 4"
BED AREA (L-R, F-B) ..... 78" X 42"
SHUT HEIGHT ..... 12"
RAM ADJUSTMENT ..... 6"
STROKES PER MINUTE 45
WINDOW SIZE (L-R, T-B)..... 22 1/2" X 12" 22 1/4
DIMENSIONS (L X W X H) ..... 95" X 63" X 138"
WEIGHT ..... 17,500 LBS

EQUIPPED WITH:
42" X 60" T-SLOTTED BOLSTER PLATE
AIR CLUTCH & BRAKE
MOTORIZED RAM ADJUSTMENT
DUAL COUNTER BALANCE
SURGE TANK
AUTO LUBE
INCH-SINGLE-CONTINUOUS SETTING
TOP STOP
DUAL PALM STATION
HORSEPOWER: 15

$ 42,500

Kell Bill

TEMPORARY SPECIFICATIONS SUBJECT TO VERIFICATION
ALL QUOTATIONS SUBJECT TO PRIOR SALE

STERLING MACHINERY EXCHANGE

BY:_____

Page ____ of ____

#3 . 57,500

Sterling Machinery Exchange
WEB:WWW.sterlingmachineryexch.com
9310 GARVEY AVE
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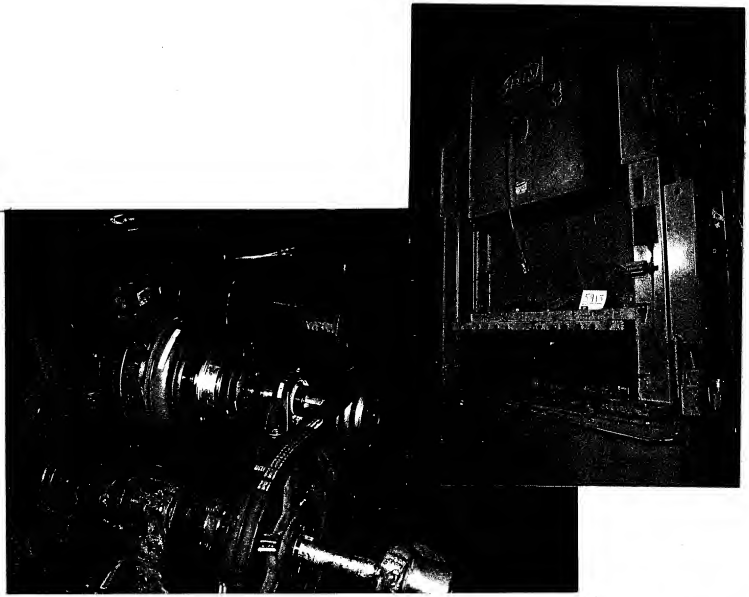

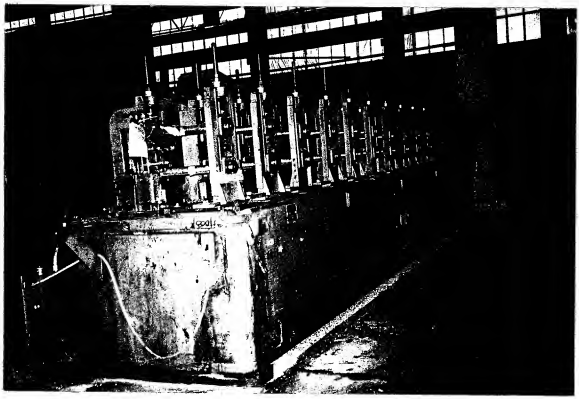

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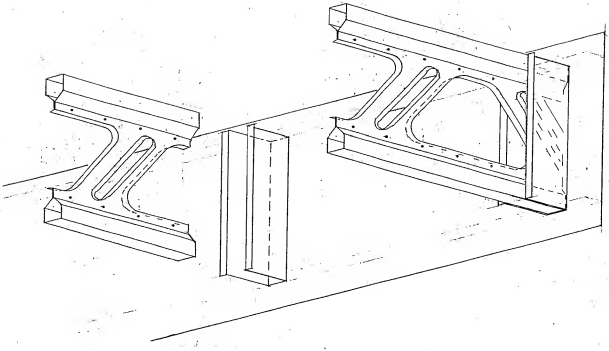
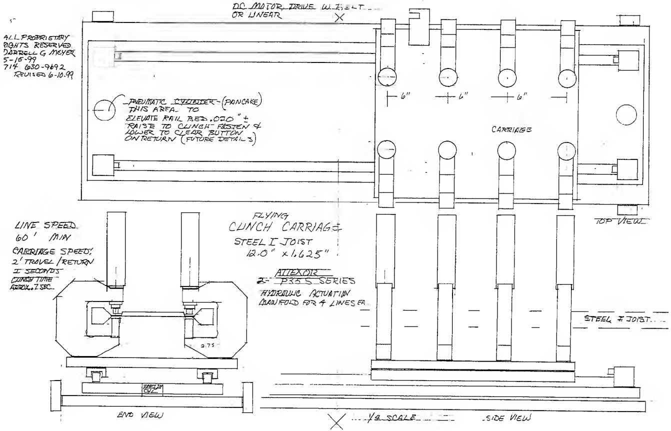


EXHIBIT 40



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STEEL I JOIST
2.75
END VIEW
1/4 SCALE
SIDE VIEW

EXHIBIT 41

STRUCTURAL EVALUATION OF STEELWORKS' SteelIJoist™

Prepared for

USS/POSCO
900 Loveridge Road
Pittsburg, CA 94565

and

SteelWorks
3822 E. La Palma Avenue
Anaheim, CA 92807

by

NAHB Research Center, Inc.
400 Prince George's Boulevard
Upper Marlboro, MD 20774-8731

June 1999

NAHB RESEARCH CENTER

America's Housing Technology and Information Resource

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Acknowledgements

This report was prepared by the NAHB Research Center for USS/POSCO. The Research Center expresses great appreciation to the sponsor of this work, USS/POSCO, in view of its relevance to more affordable design and construction of residential and light commercial floor systems using cold-formed steel framing. Special appreciation is extended to Ken Vought of USS/POSCO and Darrell Meyer of SteelWorks for their assistance throughout the project.

The principal author and investigator of this report is Nader R. Elhajj, P.E. Technical review was provided by Jay Crandell, P.E. Lab support was provided by Christian Jacobs and administrative support was provided Lynda Marchman.

Table of Contents

1.0 Introduction

Over the past several years, the materials used to construct the frame of a home have been subject to various forces that have contributed to upward pressures on home prices. Unpredictable fluctuations in the price of framing lumber, as well as concerns with its quality, have caused builders and contractors to seek alternative building products.

Cold-formed steel (CFS) joists have been used where large spans are called for and where engineered wood joists are too costly to use. However, one of the major barriers to the use of CFS floor joists is the impact it has on placement of large waste drains and ductwork installed in the floor system. Current requirements limit maximum hole (opening) sizes in CFS joists to about 2.5-inches (6.35 cm) in diameter. This limitation can accommodate short plumbing runs and electrical wiring, but restricts the use of larger and longer septic drains and ductwork.

The SteelIJoist™ provides the builder with a truss shaped joist with lengths up to 40 feet that can easily accommodate plumbing and waste lines as well as HVAC installation. The SteelIJoist™ is fabricated by a continuous roll forming process with punched openings, formed flanges, and mechanically fastened chord sections. The top and bottom chord sections of a SteelIJoist™ have pentagonal shapes that provide flat sides for attachment to end caps, hangers and brackets. Each SteelIJoist™ has trapezoidal shaped folded web openings at 24 inches on center, along the entire length of the joist that can accommodate up to 6-inch diameter passage for utilities. A web foldout further stiffens the web between the trapezoidal openings. The joist system comes with a predesigned and precut end cap that fits on either end of the joist. The end cap is used to attach the SteelIJoist™ to the rim track. The SteelIJoist™ comes in one size that is 12'-inches deep with two thicknesses, 18 and 20 gauge, as shown in Figure 1.

Some of the practical benefits of this innovation in the design of CFS floor joists are as follows:

- job site flexibility (i.e. constructability);
- allowance for larger HVAC ducts, plumbing, and electrical systems in the floor cavity;
- elimination of shrinkage problems occasionally experienced with wood frame floors;
- capability of long spans;
- light weight (approximately 2.8 lb/ft);
- may be cut at any dimension using end caps;
- factory end caps (two types) that are easy to attach; and
- factory rim tracks (bands) with end caps attached available.

The objective of this test program is to determine the structural performance of 18 gauge and 20 gauge, 12-inches deep SteelIJoist™. Joist serviceability issues (such as vibration and noise) are not addressed in this report.

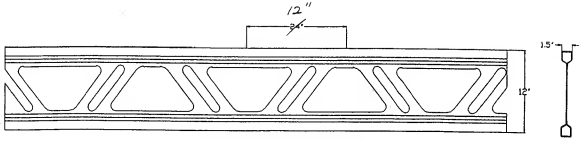


Figure 1 - SteelIJoist™ Detail

2.0 Experimental Approach

Test Plan and Specimens

A total of 39 SteelIJoist™ joist assemblies and components were tested in a variety of configurations as shown in Table 1. All steel materials had a minimum specified tensile strength of 50 ksi that was verified by tensile tests in accordance with ASTM A370 [1]. Tensile tests were performed on a sample of three joists for each joist thickness. Base steel thicknesses were measured in accordance with ASTM A90 [2]. Mechanical properties were based on coupons cut longitudinally from the center of the specimen's web.

Table 1
SteelIJoist™ Test Plan

SteelIJoist™ Web Depth (in)	Thickness (Gauge)	Yield Strength (ksi)	Span Length (ft-in)	Test No.	Planned Loading and/or Failure Mode
12	20	50	2'-0"	1,2	Shear
12	20	50	10'-0"	3,4	Combined Shear & Bending
12	20	50	18'-0"	5,6	Bending
12	18	50	2'-0"	7,8	Shear
12	18	50	10'-0"	9,10	Combined Shear & Bending
12	18	50	18'-0"	11,12	Bending
12	20	50	2'-0"	13,14	Shear with end caps
12	18	50	2'-0"	15,16	Shear with end caps
12	20	50	6'-0"	17	Mid-span loading
12	20	50	6'-0"	18	Mid-span loading w/Drilled clinches
12	20	50	6'-0"	19,20	Mid-span loading w/Cut webs
12	18	50	6'-0"	21	Mid-span loading
12	18	50	6'-0"	22	Mid-span loading w/Drilled clinches
12	18	50	6'-0"	23,24	Mid-span loading w/Cut webs
12	18	50	8'-0"	25	8'-0" Rim Joist - Two point loading
12	18	50	6'-0"	26,27	6'-0" Rim Joist – Two point loading
End Cap	18	50	1'-0"	28,29,30	Compression load – Unstiffened end cap
End Cap	18	50	1'-0"	31,32,33	Compression load – Stiffened end cap
Coupon	20	50	0'-8"	34,35,36	Mechanical properties
Coupon	18	50	0'-8"	37,38,39	Mechanical properties
Total No. of tests				39	

Test Procedure

The specimens were tested in the NAHB Research Center's Universal Testing Machine (UTM) using the test method in ASTM D198-97 [3]. The ASTM standard requires specimens to be mounted in a testing apparatus capable of applying measurable loads at a constant load rate.

The cross-head of the UTM was fitted with an apparatus capable of applying the total load at one point or two points equidistant from the reactions. The locations of the two point loads and end reactions divide the specimen (bending test) into three equal sections. The load was applied by the UTM and transmitted to the load plates by a cross beam. The following information was recorded and reported for each test:

- Span length (see Table 1),
- Load, support mechanics, and any lateral supports used,
- Rate of load application,
- Actual physical and mechanical properties, including thickness, yield strength, ultimate strength (coupon tests), and a statistical measure of variability of these values (see Tables A1, A2, and A3 of Appendix A),
- Description of observed failure mode, and,
- Ultimate loads and deflections and a statistical measure of variability of these values (see Tables A4 and A5 of Appendix A).

When thin steel bending members with web openings are subjected to loads, three failure modes may occur: (a) bending, (b) shear, (c) web crippling. Since end caps are used for each joist, web crippling failure modes has not been investigated in this report. Therefore, joists were tested to induce shear failure, bending failure, and combined shear and bending interaction failure.

Shear Test

The purpose of this test was to investigate the behavior of a SteelIJoist™ when subjected to a constant shear force. Two different configurations were used for shear tests. The first set of tests was conducted without end caps installed at the ends of the each specimen. End caps were installed at the end of each specimen for the second set of tests to preclude web-crippling failure. Short span members were used to minimize the influence of bending. Each test specimen utilized a single joist, simply supported, with a 24-inch long span. Rollers and bearing plates were used at each end. The beam was restrained to prevent rotation. In addition, lateral supports braced the central portion of the joist to prevent lateral movements at mid span. A concentrated load was applied near the joist support, as shown in Figure 2. A deflection gage was placed under the joist to measure the vertical deflection of the test specimen at mid-span.

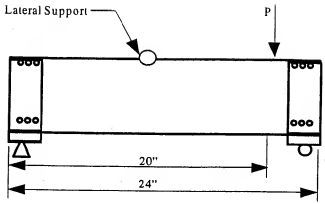


Figure 2 - Shear Test Setup (with end caps)

Bending Test

The purpose of this test was to investigate pure bending capacity of a SteelIJoist™ stabilized against lateral-torsional buckling. To stabilize the specimen against lateral-torsional buckling, each test specimen consisted of two SteelIJoist™ sections inter-connected by 23/32-inch thick oriented-strand-board (OSB) and 5/8- inch thick gypsum board strips. The 6-inch x 16-inch x 1/2-inch OSB strips were spaced at 24-inches on center and fastened to top flanges with #10 self-drilling, tapping screws (two screws per flange). The 5/8-inch gypsum board strips were also spaced at 24-inches on center and fastened to the bottom flanges with #10 self-drilling, tapping screws (two screws per flange). The test set up is shown in Figure 3. End caps were used at the end of the assembly to prevent the joists from moving laterally and rotating. Rollers and bearing plates were used at each end of the assembly. Two concentrated loads were applied at third point locations of each specimen. This loading arrangement provided a pure moment region in the central portion of the beam while the two end sections experienced a linearly increasing bending moment with increasing distance from the ends. A deflection gage was placed under the assembly at mid-span to measure the vertical deflection of the test specimen.

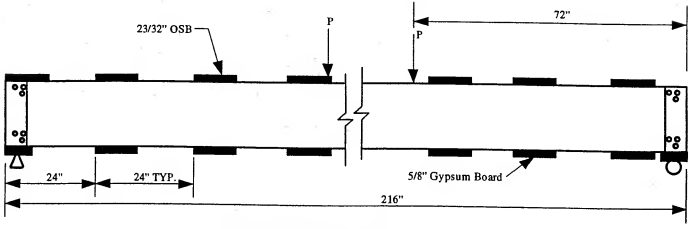


Figure 3 - Bending Tests Setup

Combined Shear and Bending (Interaction) Test

The purpose of this test is to investigate the behavior of a single SteelIJoist™ subjected to a combined shear force and bending moment. Each test specimen was tested as a continuous two-span beam subjected to two point loads. The continuous joist length was 10-feet, with each span 60-inches long. Point loads were applied at a distance of 30-inches from each end. Rollers and bearing plates were used at each end and a bearing plate was used at mid-span. End caps were used at the both ends to prevent the beam from moving laterally or rotating. In addition, lateral supports were attached to the central portion of the beam to prevent lateral-torsional buckling of the test specimens. Deflection gages were placed under each point load to measure the vertical deflection of the test specimen. The combined shear and bending test configuration is shown in Figure 4.

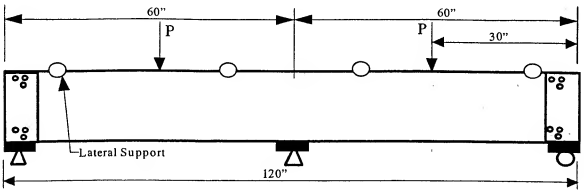


Figure 4 - Combined Bending and Shear Test Setup

Mid-Span Loading with Cut Webs or Drilled Clinches

The top and bottom chords of each SteelIJoist™ are typically clinched at 3-inch on center. A six-foot joist specimen was tested with every other clinch drilled out to investigate the impact of increasing the spacing between clinches. Tests were also conducted to investigate the impact of removing one of the vertical folded webs along the beam except at the ends.

Tests were conducted utilizing single simply supported joists. Rollers and bearing plates were used at each end. End caps were used at the ends to prevent the joist from moving laterally or rotating. In addition, braces were attached to the central portion of the joist. The test configuration is shown in Figure 5.

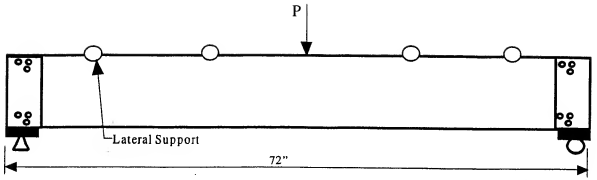


Figure 5 – Mid-span Loading for Drilled Clinches and Cut Webs Test Setup

Rim Joist Test

Two rim joist configurations were tested to determine their capacity in resisting gravity loads. The purpose of these tests is to investigate the potential use of the rim joists as headers.

One 8-foot and two 6-foot simply supported rim joist assemblies were tested. Rollers and bearing plates were used at each end. Partial SteelIJoist™ were fastened to the rim joist at 24-inches on center as shown in Figure 6. The rim joist assembly was stabilized against rotation and lateral buckling by using lateral supports. Point loads were applied at a distance of 1/3 span from each end.

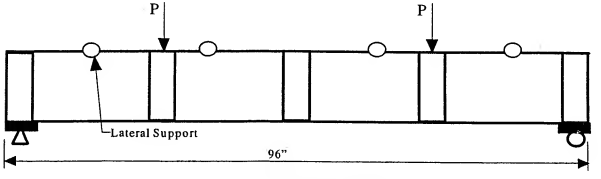


Figure 6 – Rim Joist Test Setup

End Cap Test

All end caps used in the tests were 43 mil (18 gauge) thick. Two end cap configurations were tested to establish their compressive strength. The two configurations are described below:

- Standard end cap consisting of a U-shaped section with return lips bent towards the outside of the U-shape as shown in Figure 7.

- Stiffened end cap with intermediate stiffeners along the flanges of the U-shaped section as shown in Figure 8.

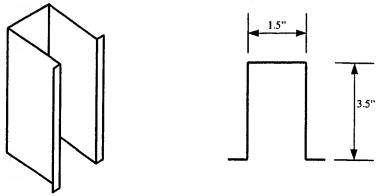


Figure 7 – Standard End Cap

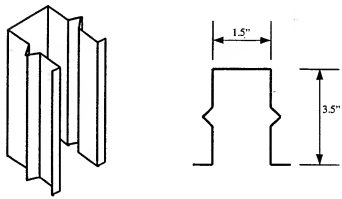


Figure 8 – Stiffened End Cap

3.0 Test Results

Tensile Coupon Tests

The mechanical properties of the steel used for the SteelIJoist™ specimens were established by standard tensile coupon tests as described previously. Table A1 (Appendix A) lists the tensile test data for yield strength (F_y), ultimate tensile strength (F_u), uncoated steel thickness (t) and percent elongation in 2-inch (5.1 cm) gage length. Mean property values shown in Table A2 of Appendix A were used for analytical purposes.

Shear Tests

Four SteelIJoist™ were tested for shear strength. The results are tabulated in Table A4 of Appendix A. Table 2 shows the average shear capacity at peak loads per web, V_t.

7

Table 2
Shear Test Results

SteelIJoist™ Size[1]	Span Length (in.)	V_t (lb.)
12 x 33	24	1,402
12 x 43	24	2,371
12 x 33 w/end caps	24	3,246
12 x 43 w/end caps	24	4,556

[1]Refer to Table 1 for actual joist dimensions.

Bending Tests

A total of four SteelIJoist™ specimens were tested for bending strength. The results are tabulated in Table A4 of Appendix A. Joist mid-span deflections were also recorded and tabulated in Table A5 of Appendix A. The average ultimate capacity, per joist, at peak load, $P_{u(test)}$, for each joist type is recorded in Table 3. Table 3 also lists the average ultimate moment capacity, M_t, for each test specimen computed on the basis of the average ultimate peak load, $P_{u(test)}$.

Table 3
Bending Test Results

SteelIJoist™ Size[1]	Span Length (in.)	$P_{u(test)}$ (lb.)	Deflection @ $P_{u(test)}$[2] (in.)	M_t (in-lb)
12 x 33	216	2,100	1.44	75,600
12 x 43	216	2,894	1.76	104,184

[1]Refer to Table 1 for actual joist dimensions.
[2]Deflection measurements were taken at mid-span.

Combined Shear and Bending Tests

A total of four SteelIJoist™ specimens were tested and failed in combined shear and bending. The results are tabulated in Table A4 of Appendix A. Table 4 shows the average ultimate capacity at peak load, $P_{u(test)}$, the ultimate shear load, V_t, computed as $(0.69P_{u(test)}/2)$, and the ultimate bending moment, M_t, computed on the basis of V_t.

Table 4
Combined Shear and Bending Test Results

SteelIJoist™ Size[1]	Span Length (in.)	$P_{u(test)}$ (lb.)	V_t (lb.)	M_t (in-lb)
12 x 33	120	4,124	1,423	23,136
12 x 43	120	5,604	1,933	31,438

[1]Refer to Table 1 for actual joist dimensions.

Mid-Span Loading with Cut Webs or Drilled Clinches Tests

A total of one 6-foot, 18 gauge and one 6-foot, 20 gauge SteelIJoist™ were tested as simply supported spans subjected to a point load at mid-span to establish a base line capacity. Another 6-foot, 18 gauge and 6-foot, 20 gauge SteelIJoist™ specimens were tested with every other clinches drilled out. Two 6-foot, 20 gauge and two 6-foot, 18 gauge SteelIJoist™ specimens were also tested with the webs between the trapezoidal openings cut out. The webs at the ends of the joists remained uncut. The results are tabulated in Table A4 of Appendix A. Table 5 shows the average ultimate capacity at peak load, $P_{u(test)}$, and the ultimate bending moment, M_t, computed on the basis of $P_{u(test)}$.

Table 5
SteelIJoist™ with Drilled Clinches and Web Cut Outs Test Results

SteelIJoist™ Size[1]	Span Length (in.)	Joist Condition	$P_{u(test)}$ (lb.)	Deflection @ $P_{u(test)}$[2] (in.)	M_t (in-lb)
12 x 33	72	Master Joist	2,162	0.350	38,916
12 x 43	72	Master Joist	3,468	0.340	62,424
12 x 33	72	Drilled Clinches	2,052	0.310	36,936
12 x 43	72	Drilled Clinches	3,277	0.380	58,986
12 x 33	72	Webs Cut Out	2,065	0.345	37,170
12 x 33	72	Webs Cut Out	3,178	0.378	57,204

[1]Refer to Table 1 for actual joist dimensions.
[2]Deflection measurements were taken at mid-span.

Rim Joist Tests

A total of three SteelIJoist™ rim joist specimens were tested for bending strength. The results are tabulated in Table A4 of Appendix A. Joist mid-span deflections were recorded and tabulated in Table A5 of Appendix A. The average ultimate capacity at peak load, $P_{u(test)}$, for each rim track is recorded in Table 6. Table 6 also lists the average ultimate moment capacity, M_t, for each test specimen computed on the basis of the average ultimate peak load, $P_{u(test)}$.

Table 6
Rim Track Test Results

Rim Joist Size	Span Length (in.)	$P_{u(test)}$ (lb.)	Deflection @ $P_{u(test)}$[1] (in.)	M_t (in-lb)
12 x 43	96	2,333	0.440	37,328
12 x 43	72	4,426	0.355	53,112

[1]Deflection measurements were taken at mid-span.

End Cap Tests

A total of six SteelIJoist™ end caps were tested for compressive strength. The results are tabulated in Table A4 of Appendix A. The average ultimate capacity at peak load, $P_{u(test)}$, for each end cap is recorded in Table 7.

Table 7
End Cap Compression Test Results

End Cap Thickness (mil)	End Cap Configuration	End Cap Height (in.)	$P_{u(test)}$ (lb.)
43	Unstiffened	12	11,323
43	Stiffened	12	17,789

Failure Modes

Shear

The maximum shear stress occurs at mid-depth of the web. Where web material is removed as for a web opening, a stress concentration is created at the corners of the opening that typically creates premature shear failure of the SteelIJoist™. This failure mode, however, was not observed in the shear tests. In all specimens tested for shear, the failure mode was not pure shear failure. Failure occurred mainly due to web buckling, flange curling, web rotation, and/or stiffener buckling. This is a clear indication that SteelIJoist™ joists will not typically fail in shear.

Bending

For bending test specimens, the failure pattern is defined by either local buckling or mixed local and lateral-torsional buckling. The lateral-torsional buckling mode would typically result in premature web failure of test specimens. The test specimens did not show signs of lateral-torsional buckling. All test specimens failed in local buckling and yielding. The OSB and gypsum board strips provided adequate lateral strength to prevent the lateral-torsional mode of buckling. No deformation of the web openings was observed at failure of any of the specimens. Failed specimens were not severely deformed.

Combined Bending and Shear

For test specimens that failed by the combined shear and bending behavior, the failure pattern occurred as a bending type failure at mid-span and a diagonal shear failure between the load points. These two failure modes occurred simultaneously as the ultimate load was achieved. Folded edges at web openings or web stiffeners did not show any deformation at failure loads.

Mid-Span Loading with Cut Webs or Drilled Clinches

The failure pattern for these specimens was similar to the joists tested and failed in bending. Beam specimen with drilled clinches showed slight separation between the clinched sheets of the steel that are located within a close proximity to the loading plates. Deformation or failure of the clinches was not observed.

Beams with cut webs also exhibited a similar failure pattern to those beams tested for bending loads. Failure occurred by buckling in the webs within a close proximity to the loading plates.

Rim Joists

The 8-foot rim-joist specimen failed prematurely due to warping and lateral torsional buckling. The ends were

End Caps

All end-caps failed in column buckling at approximately mid-height.

4.0 Analysis of Test Data

The SteelIJoist™ performed extremely well in all tests. The bending, shear, and combined shear and bending strengths are well above those of a typical C-shaped 12-inch joist. Mid-span deflections were also within the recommended deflection limit (L/360 or L/480) that is usually used in designing residential and light commercial buildings.

Shear tests showed that a SteelIJoist™ would perform better with end caps fastened to the ends of the joists. End caps are also necessary to eliminate potential failures due to web crippling.

Reducing the Number of Clinches

Tests with every other clinch drilled out resulted in a SteelIJoist™ ultimate capacity that is within 5 percent of that of a standard SteelIJoist™. Therefore, increasing the spacing between clinches will have negligible impact on the overall performance of the SteelIJoist™.

Cutting the Webs between Openings

Tests with webs between openings cut out (except for the end webs) resulted in a SteelIJoist™ ultimate capacity that is within 5 percent of that of a SteelIJoist™ without web cut outs. Therefore, cutting the webs along the length of a SteelIJoist™ will have negligible impact on the overall performance of the SteelIJoist™.

Changing Number of Screws

Tests performed on SteelIJoist™ specimens with end caps fastened with 3-#10 screws instead of 5-#10 screws resulted in a capacity that is similar to those with 5-#10 screws. Therefore, end caps fastened to a SteelIJoist™ with 3-#10 screws should perform its intended function adequately.

SteelIJoist™ Allowable Loads

Table 8 summarizes the allowable tested values (using a factor of safety of 2.0 as calculated in Appendix B).

Table 8
Tested Allowable Loads

SteelIJoist™ Size[1] (Web depth x thickness)	Failure Mode[2]	Tested Ultimate Load[3] lb.	Allowable Tested Load[4] lb.
12 x 33	Shear	1,402	701
12 x 33	Shear w/end caps	3,246	1,623
12 x 33	Bending	2,100	1,050
12 x 33	Shear & Bending	4,124	2,062
12 x 43	Shear	2,371	1,186
12 x 43	Shear w/end caps	4,556	2,278
12 x 43	Bending	2,894	1,447
12 x 43	Shear & Bending	5,604	2,802

[1]Refer to Table 1 for actual joist dimensions.
[3]Values are based on an average of two tests (minimum) per configuration.
[4]The allowable tested load is calculated as the tested "ultimate" load divided by a factor of safety of 2.0 (refer to Appendix B).

Table 9 provides the SteelIJoist™ maximum allowable spans for residential floors. The spans are based on a maximum uniform live load of 30 and 40 psf and maximum floor dead load of 10 psf.

Table 9
Allowable Spans for SteelIJoist™ Floor Joists[1]

SteelIJoist™ Depth	Steel ThicknessGauge	30 psf Live Load				40 psf Live Load			
		SteelIJoist™ O.C. Spacing				SteelIJoist™ O.C. Spacing			
		12"	16"	19.2"	24"	12"	16"	19.2"	24"
12	20	25'-1"	21'-9"	19'-11"	17'-9"	22'-5"	19'-5"	17'-9"	15'-11"
12	18	29'-6"	25'-6"	23'-4"	20'-10"	26'-4"	22'-9"	20'-10"	18'-8"

[1]All steels shall have minimum yield strength of 50 ksi.

5.0 Summary, Conclusion and Recommendation

The objective of this investigation was to study the behavior of SteelIJoist™ floor joist members with trapezoidal web openings with folded edges subjected to shear, bending, and combined shear and bending. The trapezoidal web opening had folded edges that stiffened the web around the opening. A total of 39 tests were performed. Based on the findings of this study, the following conclusions and recommendations regarding the behavior and installation of SteelIJoist™ floor joists with relatively large, stiffened openings (i.e. folded edges) under gravity loads can be made:

- The presence of trapezoidal web openings with folded edges did not reduce the ultimate shear, bending, and combined shear and bending strengths. Actually, the folded edge web openings resulted in an increase in the strength of joist specimens investigated in this study.

- The presence of trapezoidal web openings did not promulgate any failure. All observed failures took place at a distance from the openings. None of the web openings experienced any significant deformation under any of the loading conditions examined.

- Shear strength was not a controlling factor in the design of SteelIJoist™ joists with web openings as identified in this report. Pure shear failure did not occur in any of the tested specimens.

- SteelIJoist™ joists with trapezoidal web openings (with folded edges) can be safely used in residential and light commercial construction to accommodate long septic drains, plumbing runs, routing of ductwork, and other trade installations.

- SteelIJoist™ joists provide clear unsupported spans that exceed those for typical C-shaped joists by approximately 25%. This would allow the end user to drop at least one gauge for a particular span. The SteelIJoist™ joist allows the end user to utilize lighter gauge steels that are not available in regular C-shaped joists. Using lighter gauge steels would result in lower material and labor costs (especially fastening time).

- The on center spacing between the clinches can be safely increased to 4 or 5-inches without any degradation in the strength of the joist.

- One web of each trapezoidal opening can be safely removed without any degradation in the strength of the joist (webs should not be removed at either end of the joist).

- The number of screws connecting the end caps to the SteelIJoist™ ends can be reduced to 3-#10 screws without degrading the strength of the joist. Further reduction in the number of screws per side should be investigated.

- The top and bottom chord flange widths of 1-1/2" could cause a problem for fastening sheathing and drywall to the joist. A minimum of 1-5/8" flanges should be specified. This would give the framers more flat surface to accommodate two sheets of sheathing and would eliminate potential concerns by end users. This change would also make the SteelIJoist™ flange width similar to that specified for typical C-shaped joists.

- A 10-inch deep SteelIJoist™ is expected to behave as well as or better than the 12-inch deep joist tested in this report. This will result in tremendous savings in steel and provides an additional 2-inches of headroom.

- Web openings foldouts have sharp edges. This would cause significant concerns to sub-trade installations. Sharp edges should be smoothed out.

- The end-cap connection to the joist requires an added effort that could impact the efficiency or cost-effectiveness of the SteelIJoist™. A better connection detail utilizing the rim track should be investigated.

6.0 References

[1] ASTM A 370- 1997a, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*, American Society for Testing and Materials (ASTM), West Conshohocken, PA.

[2] ASTM A 90/A90M-1995, *Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings,* American Society for Testing and Materials (ASTM), West Conshohocken, PA.

[3] ASTM D 198-1997, *Standard Test Methods of Static Tests of Lumber in Structural Sizes.* American Society for Testing and Materials (ASTM), West Conshohocken, PA.

APPENDIX A

TEST RESULTS

Table A1
Physical and Mechanical Properties of Test Specimens

SteelJoist™ Size (web depth x thickness)	Web Size (in)	Top Chord Width (in)	Bottom Chord Width (in)	Thickness (mil)	Yield Point[1] (ksi)	Tensile Strength[1] (ksi)	Uncoated Thickness[2] (in.)	Elongation[3] (percent)
12x33	12	1.5	1.5	33	51,025	61,560	0.0345	15.1
12x33	12	1.5	1.5	33	52,340	61,395	0.0347	16.2
12x33	12	1.5	1.5	33	51,780	61,508	0.0348	15.9
12x43	12	1.5	1.5	43	52,220	61,468	0.0465	14.8
12x43	12	1.5	1.5	43	51,980	62,120	0.0468	16.1
12x43	12	1.5	1.5	43	51,800	61,030	0.0465	15.8

[1]Tested per ASTM A 370 [14].
[2]Tested per ASTM A 90 [15].
[3] Tested per ASTM A 370 [14] for a 2-inch gauge length.

Table A2
Mean Physical and Mechanical Properties of Test Specimens[1,2]

SteelJoist™ Size (web depth x thickness)	Yield Point (ksi)	Tensile Strength (ksi)	Uncoated Thickness (in.)	Elongation (percent)
12 x 33	0.0347	51,715	61,488	15.7
12 x 43	0.0467	52,000	61,539	15.6

[1]Values shown represent the mean of three tests per specimen.
[2]Refer to Table A3 for standard deviation and coefficient of variation (COV).

Table A3
Standard Deviation and Coefficient of Variation of Physical and Mechanical Properties

SteelJoist™ Size (web depth x thickness)	Standard Deviation (σ)		
	Yield Strength (ksi)	Tensile Strength (ksi)	Uncoated Thickness (in.)
12 x 33	660	84	0.568
12 x 43	211	549	0.681
SteelJoist™ Size (web depth x thickness)	**Coefficient Of Variation (COV) [1]**		
	Yield Strength	**Tensile Strength**	**Uncoated Thickness**
12 x 33	0.013	0.001	0.036
12 x 43	0.004	0.009	0.044

[1] COV equals the standard deviation divided by the mean.

Table A4
Tested Ultimate Capacity of SteelIJoist™

Test No.	SteelIJoist™ Size [1]	Joist Thickness (gauge)	Joist Span (ft-in.)	Test Mode	Ultimate Load [2] (lb)	Mid-span Deflection [3] (in)
1	12 x 33	20	2'-0"	Shear	1,371	0.165
2	12 x 33	20	2'-0"	Shear	1,432	0.137
3	12 x 33	20	10'-0"	Shear & Bending	3,936	0.435
4	12 x 33	20	10'-0"	Shear & Bending	4,312	0.400
5	12 x 33	20	18'-0"	Bending	4,114 [4]	1.400
6	12 x 33	20	18'-0"	Bending	4,284 [4]	1.480
7	12 x 43	18	2'-0"	Shear	2,305	0.180
8	12 x 43	18	2'-0"	Shear	2,436	0.230
9	12 x 43	18	10'-0"	Shear & Bending	5,812	0.430
10	12 x 43	18	10'-0"	Shear & Bending	5,396	0.375
11	12 x 43	18	18'-0"	Bending	5,786 [4]	1.760
12	12 x 43	18	18'-0"	Bending	5,787 [4]	1.760
13	12 x 33	20	2'-0"	Shear with end caps	3,202	0.135
14	12 x 33	20	2'-0"	Shear with end caps	3,289	0.130
15	12 x 43	18	2'-0"	Shear with end caps	4,632	0.138
16	12 x 43	18	2'-0"	Shear with end caps	4,479	0.115
17	12 x 33	20	6'-0"	Mid-span loading	2,162	0.350
18	12 x 33	20	6'-0"	Drilled clinches	2,052	0.310
19	12 x 33	20	6'-0"	Cut webs	2,025	0.290
20	12 x 33	20	6'-0"	Cut webs	2,105	0.400
21	12 x 43	18	6'-0"	Mid-span loading	3,468	0.340
22	12 x 43	18	6'-0"	Drilled clinches	3,277	0.380
23	12 x 43	18	6'-0"	Cut webs	3,139	0.335
24	12 x 43	18	6'-0"	Cut webs	3,216	0.420
25	12 x 43	18	8'-0"	Rim Joist	2,333	0.440
26	12 x 43	18	6'-0"	Rim Joist	4,513	0.390
27	12 x 43	18	6'-0"	Rim Joist	4,338	0.320
28	End cap	18	12"	Unstiffened end cap	11,034	-
29	End cap	18	12"	Unstiffened end cap	11,800	-
30	End cap	18	12"	Unstiffened end cap	11,135	-
31	End cap	18	12"	Stiffened end cap	16,150	-
32	End cap	18	12"	Stiffened end cap	18,034	-
33	End cap	18	12"	Stiffened end cap	19,183	-

[1]Refer to Table 1 for actual joist dimensions.
[2]The ultimate load is the total vertical load applied to the joist at peak load.
[3]Mid-span deflections recorded at ultimate loads.
[4]Ultimate load for two joists.

APPENDIX B

SAFETY FACTOR CALCULATION

SAFETY FACTOR CALCULATION

The factor of safety used in estimating the tested allowable loads from the tested ultimate loads, in Table 11 is calculated in accordance with Section F of the AISI Design Specification [3] as follows:

The allowable axial capacity $R_a = R_n/\Omega$.

Where: R_n = Average value of the test results.

Ω = Factor of safety = $1.6/\phi$

ϕ = Resistance factor = $1.5(M_m F_m P_m)e^{-\beta_0\sqrt{V_M^2+V_F^2+C_P V_P^2+V_Q^2}}$

M_m = Mean value of the material factor = 1.10

F_m = Mean value of the fabrication factor = 1.00

P_m = Mean value of the professional factor for the tested component = 1.0

β_0 = Target reliability index = 2.5

V_M = Coefficient of variation of the material factor = 0.10

V_F = Coefficient of variation of the fabrication factor = 0.05

C_P = Correction factor = 5.7

V_P = Coefficient of variation of the test results = 4.65% (see note below)

V_P = 4.65% (for $V_p < 6.5\%$, use 6.5%)

m = Degree of freedom = 1

V_Q = Coefficient of variation of the load effect = 0.21

$\phi = 1.5(1.10x1.00x1.00)e^{-2.5\sqrt{0.10^2+0.05^2+5.7x0.065^2+0.21^2}} = 0.81$

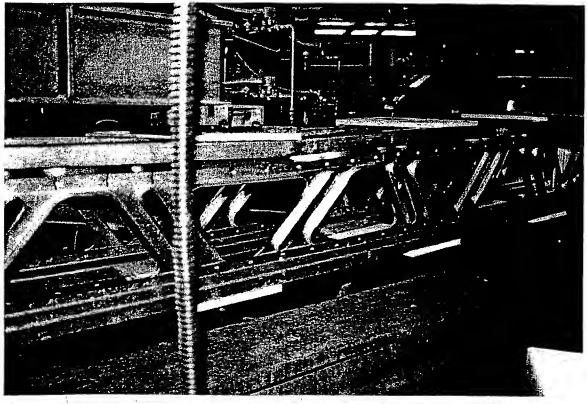
$\phi = 0.81$

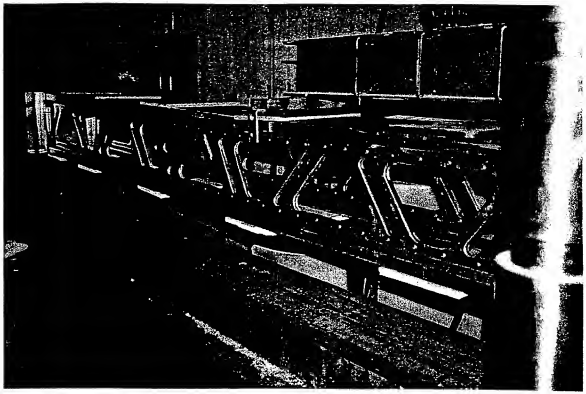
Ω = Factor of safety = $1.60/\phi = 1.60/0.81 = 1.975$ (conservatively, use 2.0)

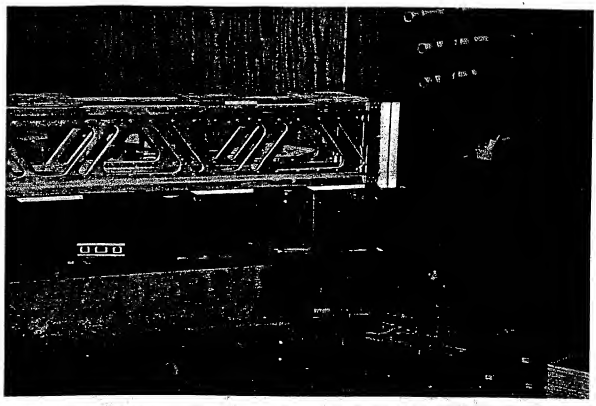
Note: The coefficient of variation (COV) of the test results is obtained by calculating the average COV of the individual COVs for each set of tests (minimum of two-test samples) and adding one standard deviation. The average COV is calculated to be 2.73 percent for all test groups. The standard deviation of all test group COVs is 1.92 percent. Therefore, the representative COV is 2.73 + 1.92 = 4.65. This represents an upper 64 percentile (plus one standard deviation) of the COV experience in the tests. It does not represent the "global" COV that may be experienced by multiple producers in various production runs. Considering this source variance in real production may tend to increase the safety factor estimate. The conservative bias relation to specific minimum strength versus actual strength is not considered in the safety factor determination. Considering this effect would tend to lower the safety factor estimate.

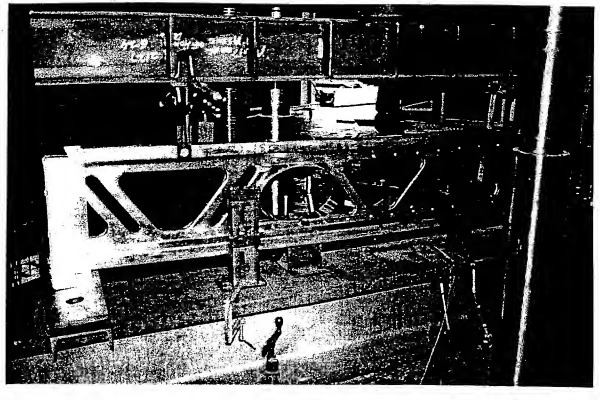
APPENDIX C

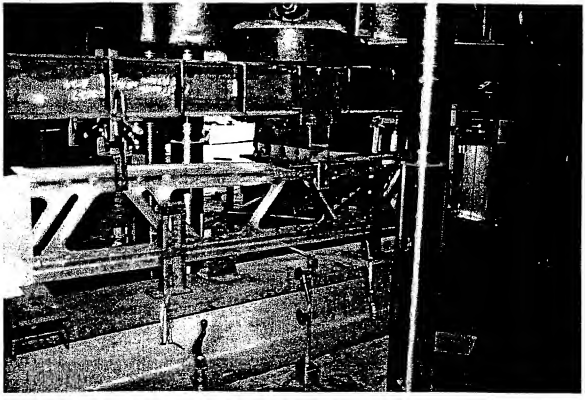
TEST PHOTOGRAPHS

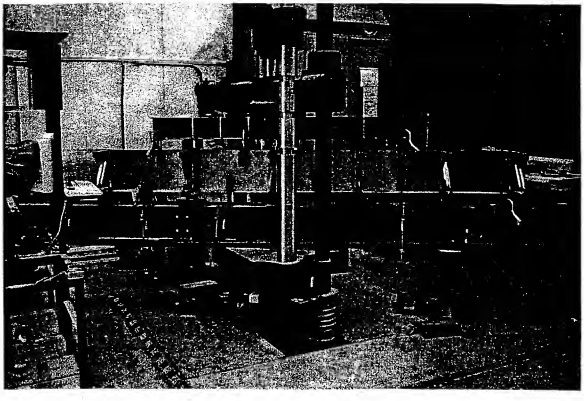


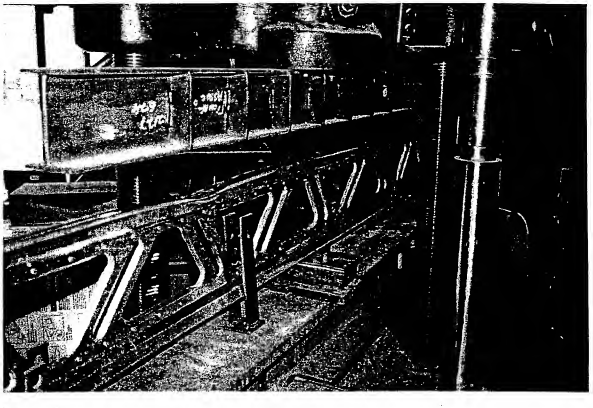


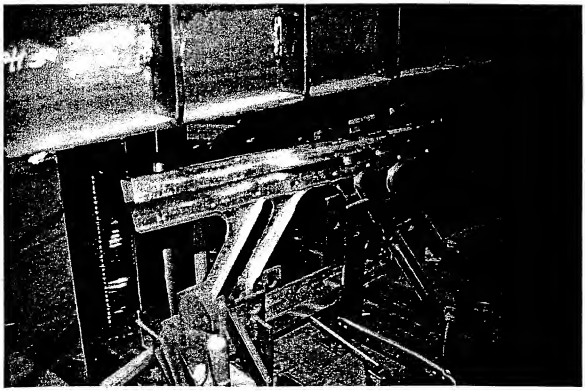


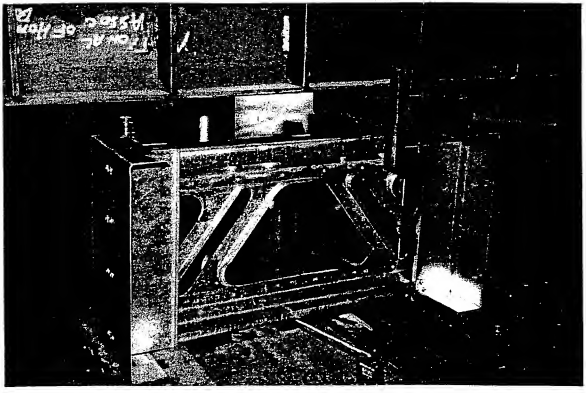


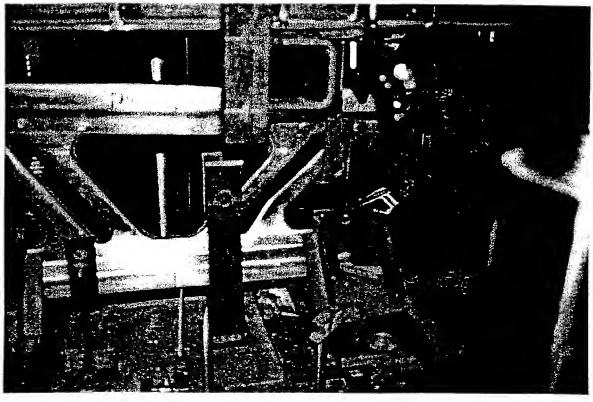












APPENDIX D

TEST PLOTS

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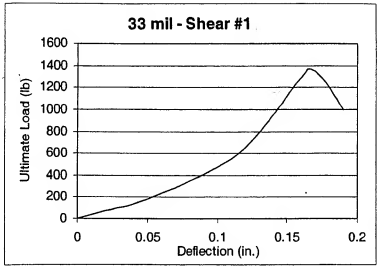

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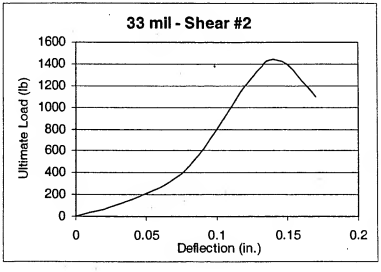

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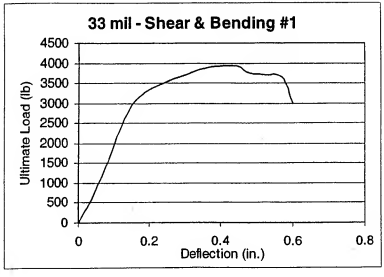

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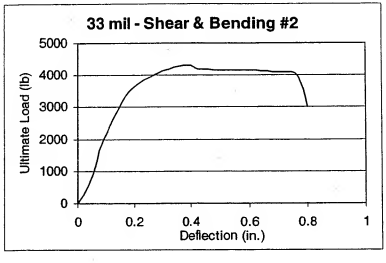

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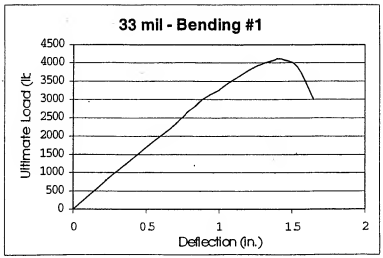

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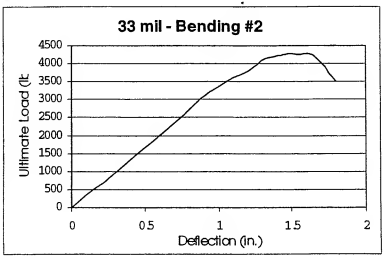

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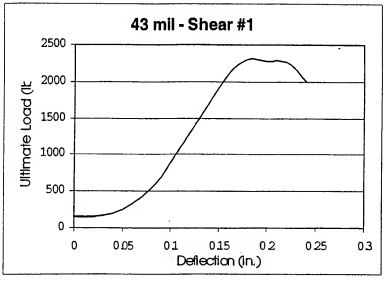

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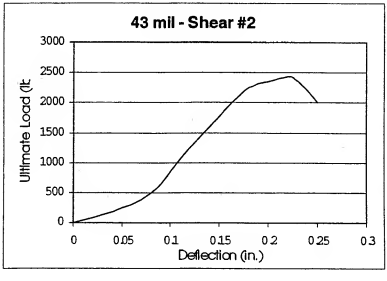

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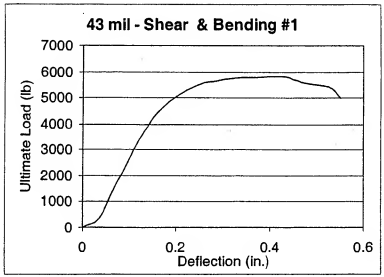

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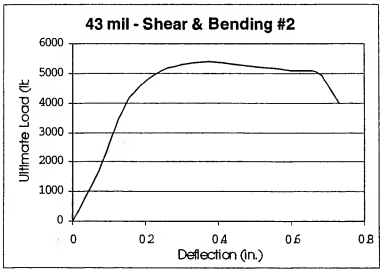

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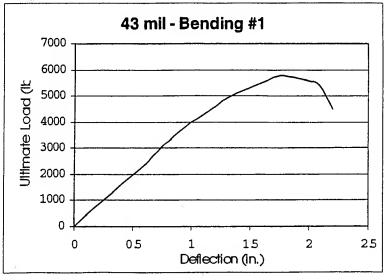

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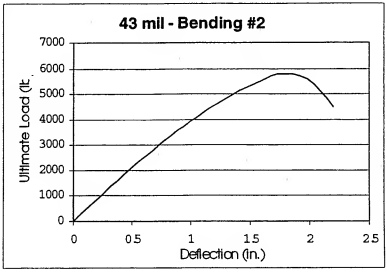

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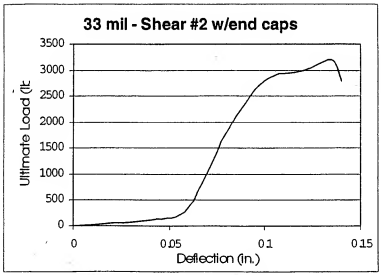

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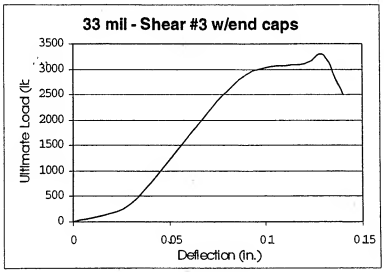

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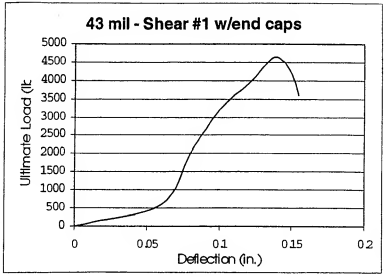

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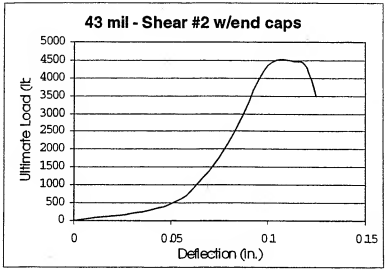

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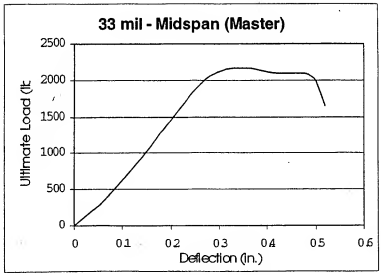

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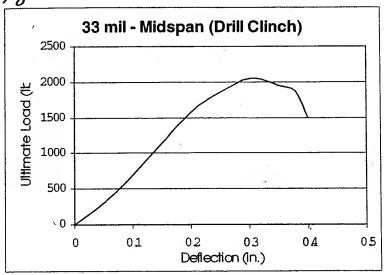

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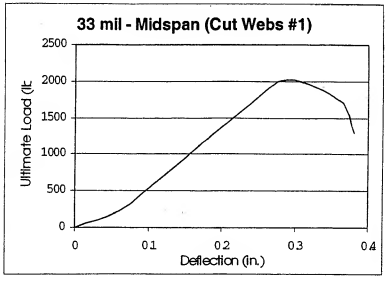

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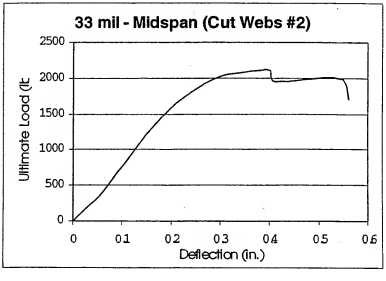

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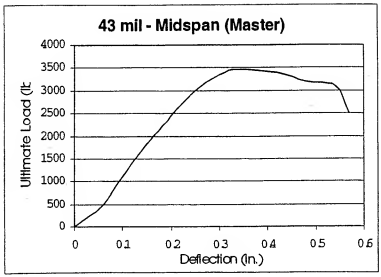

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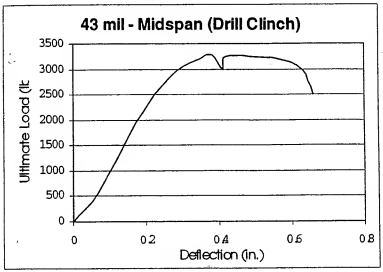
6' 18GA



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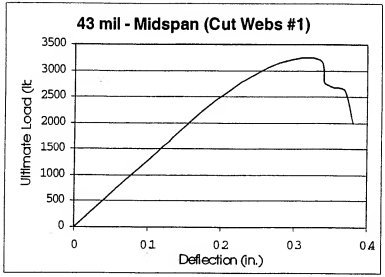
6' 18GA



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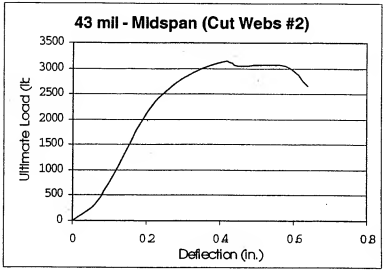
6' 18GA



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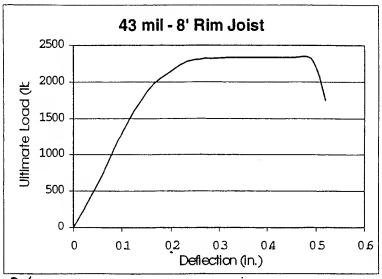
18GA 8'



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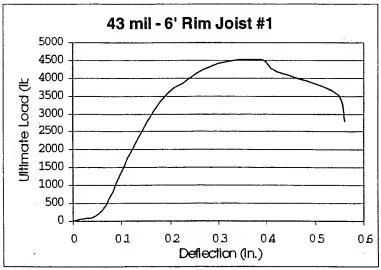
18GA 6'



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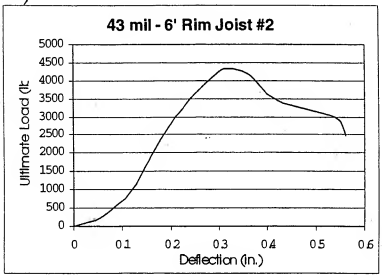
27

18 GA 6'



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26

APPENDIX E

METRIC CONVERSION

METRIC CONVERSION FACTORS

The following list provides the conversion relationship between U.S. customary units and the International System (SI) units. A complete guide to the SI system and its use can be found in ASTM E 380, Metric Practice.

To convert from	to	multiply by
Length		
inch (in.)	micrometer (μm)	25,400
inch (in.)	millimeter (mm)	25.4
inch (in.)	centimeter (cm)	2.54
inch (in.)	meter (m)	0.0254
foot (ft)	meter (m)	0.3048
yard (yd)	meter (m)	0.9144
mile (mi)	kilometer (km)	1.6
Area		
square foot (sq. ft)	square meter (sq. m)	0.0929
square inch (sq. in)	square centimeter (sq. cm)	6.452
square inch (sq. in.)	square meter (sq. m)	0.00064516
square yard (sq. yd)	square meter (sq. m)	0.8391
square mile (sq. mi)	square kilometer (sq. km)	2.6
Volume		
cubic inch (cu in.)	cubic centimeter (cu cm)	16.387064
cubic inch (cu in.)	cubic meter (cu m)	0.00001639
cubic foot (cu ft)	cubic meter (cu m)	0.02831685
cubic yard (cu yd)	cubic meter (cu m)	0.7645549
gallon (gal) Can. liquid	liter	4.546
gallon (gal) Can. liquid	cubic meter (cu m)	0.004546
gallon (gal) U.S. liquid*	liter	3.7854118
gallon (gal) U.S. liquid	cubic meter (cu m)	0.00378541
fluid ounce (fl oz)	milliliters (ml)	29.57353
fluid ounce (fl oz)	cubic meter (cu m)	0.00002957
Force		
kip (1000 lb.)	kilogram (kg)	453.6
kip (1000 lb.)	Newton (N)	4,448.222
pound (lb.)	kilogram (kg)	0.4535924
pound (lb.)	Newton (N)	4.448222
Stress or pressure		
kip/sq. inch (ksi)	megapascal (Mpa)	6.894757
kip/sq. inch (ksi)	kilogram/square centimeter (kg/sq. cm)	70.31
pound/sq. inch (psi)	kilogram/square centimeter (kg/sq. cm)	0.07031
pound/sq. inch (psi)	pascal (Pa) **	6,894.757
pound/sq. inch (psi)	megapascal (Mpa)	0.00689476
pound/sq. foot (psf)	kilogram/square meter (kg/sq. m)	4.8824
pound/sq. foot (psf)	pascal (Pa)	47.88

To convert from	to	multiply By
Mass (weight)		
pound (lb.) avoirdupois	kilogram (kg)	0.4535924
ton, 2000 lb.	kilogram (kg)	907.1848
grain	kilogram (kg)	0.0000648
Mass (weight) per length)		
kip per linear foot (klf)	kilogram per meter (kg/m)	0.001488
pound per linear foot (plf)	kilogram per meter (kg/m)	1.488
Moment		
1 foot-pound (ft-lb.)	Newton-meter (N-m)	1.356
Mass per volume (density)		
pound per cubic foot (pcf)	kilogram per cubic meter (kg/cu m)	16.01846
pound per cubic yard (lb/cu yd)	kilogram per cubic meter (kg/cu m)	0.5933
Velocity		
mile per hour (mph)	kilometer per hour (km/hr)	1.60934
mile per hour (mph)	kilometer per second (km/sec)	0.44704
Temperature		
degree Fahrenheit (°F)	degree Celsius (°C) $t_C = (t_F - 32)/1.8$	
degree Fahrenheit (°F)	degree Kelvin (°K) $t_K = (t_F + 59.7)/1.8$	
degree Kelvin (°F)	degree Celsius (°C) $t_C = (t_K - 32)/1.8$	

* One U.S. gallon equals 0.8327 Canadian gallon
** A pascal equals 1000 Newton per square meter.

The prefixes and symbols below are commonly used to form names and symbols of the decimal multiples and submultiples of the SI units.

Multiplication Factor	Prefix	Symbol
$1,000,000,000 = 10^9$	giga	G
$1,000,000 = 10^6$	mega	M
$1,000 = 10^3$	kilo	k
$0.01 = 10^{-2}$	centi	c
$0.001 = 10^{-3}$	milli	m
$0.000001 = 10^{-6}$	micro	μ
$0.000000001 = 10^{-9}$	nano	n

NAHB RESEARCH CENTER℠

America's Housing Technology and Information Resource

June 16, 1999

Mr. Ken Vought
USS/POSCO
900 Loveridge Road
Pittsburg, CA 94565

Dear Ken:

Attached please find two copies of the final report titled "*Structural Evaluation of Steelworks' SteelJoist*". We have now completed the deliverables for this project.

This has been a very active and successful project and I would like to especially thank you for your continued interest and guidance. This letter serves as our notice of final completion of the job.

The NAHB Research Center is available to assist or work with USS/POSCO to develop efficient and cost effective solutions for cold-formed steel framing and to increase steel framing market share, especially in the residential and light commercial construction markets. I am looking forward to more successful projects in the near future. Meanwhile, if you have any questions, or if I can be of further assistance, please do not hesitate to contact me directly at (800) 638-8556 ext. 581.

Sincerely,

Nader Elhajj
Project Manager

cc: Darrell Meyer (SteelWorks)

G:\jobs\3088\ken2.doc

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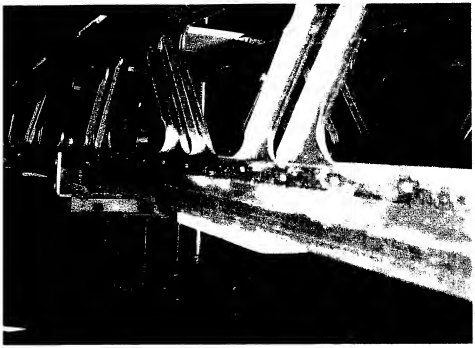
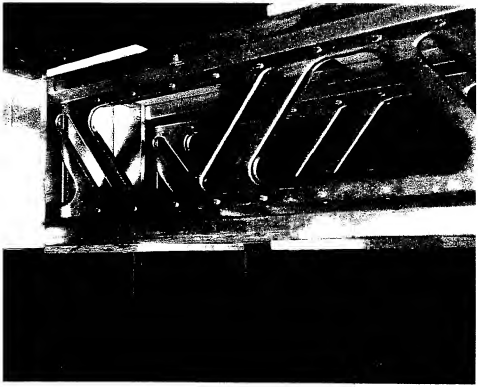
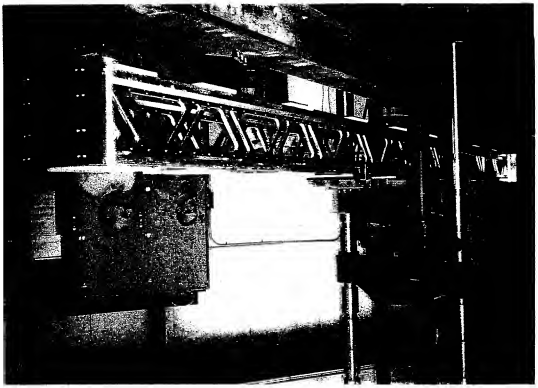
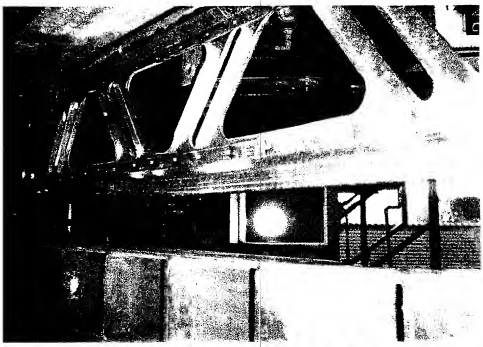
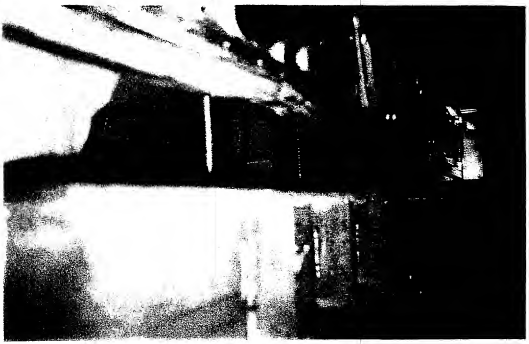
301-249-4000 • *fax* 301-249-0305 • http://www.nahbrc.org

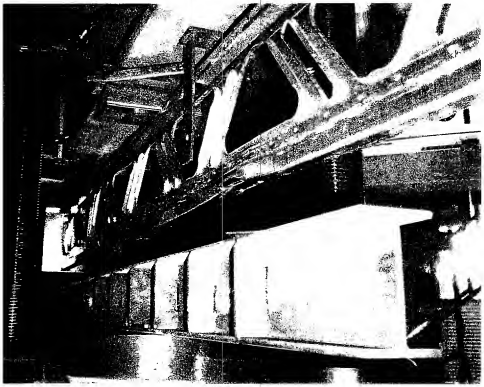


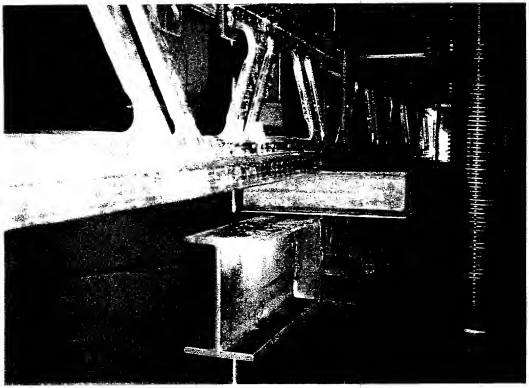


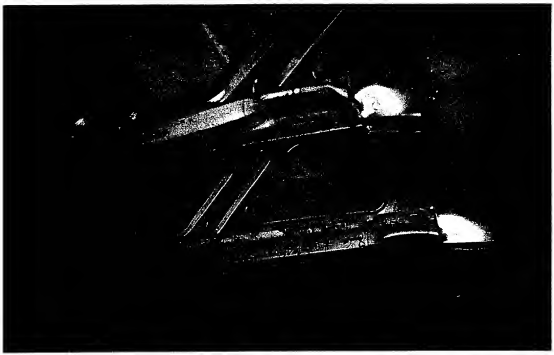


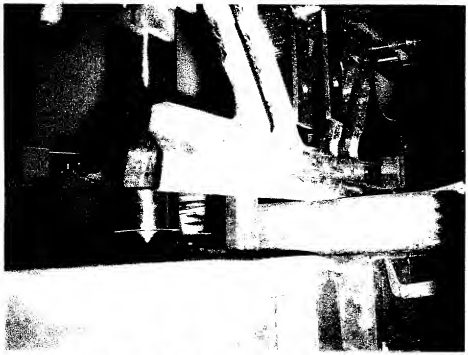


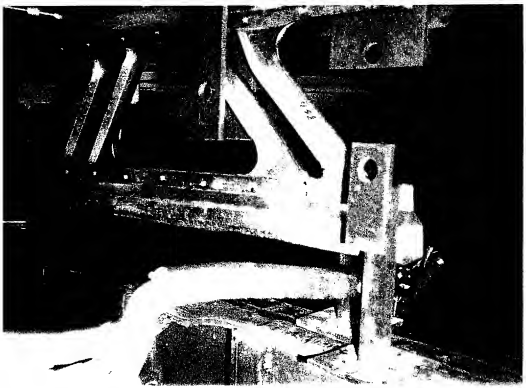


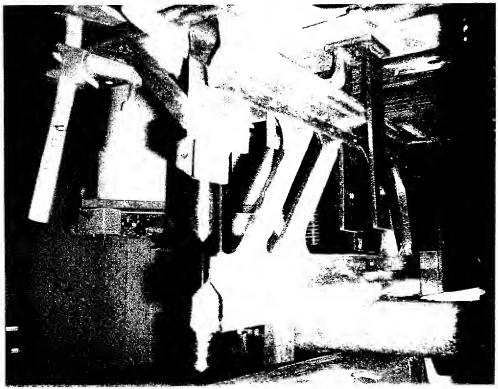


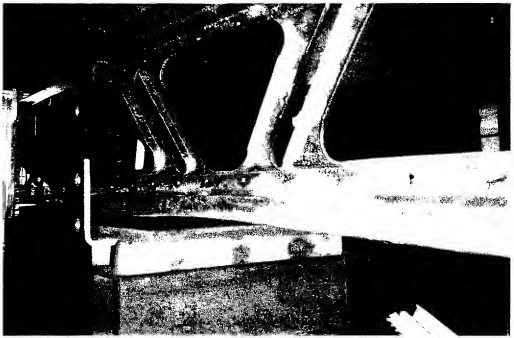


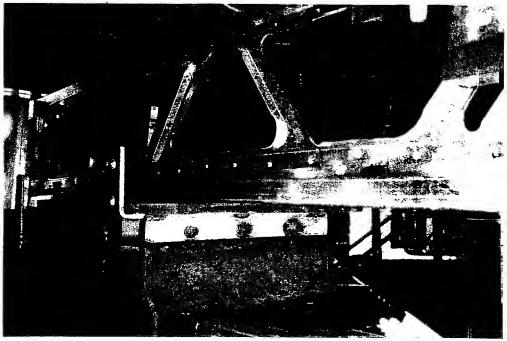


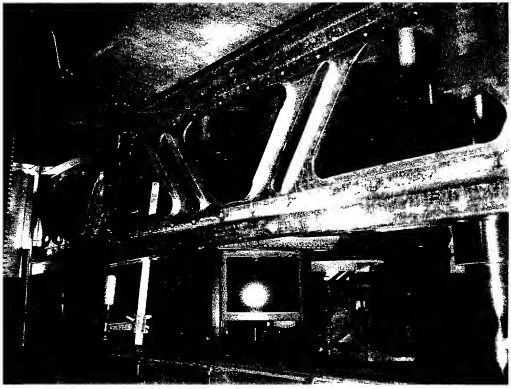


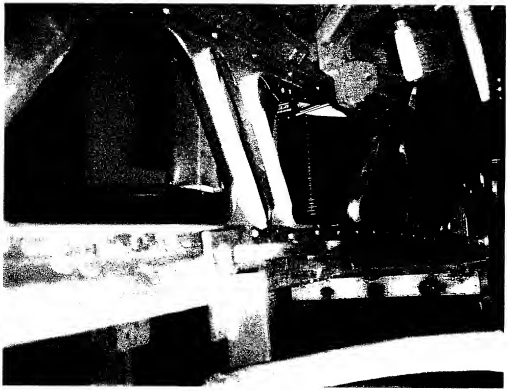


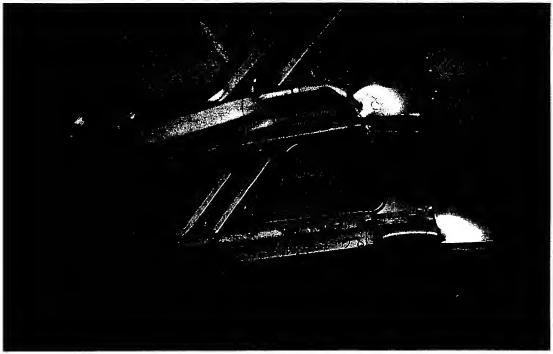


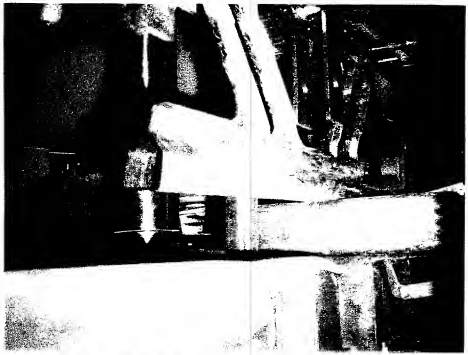


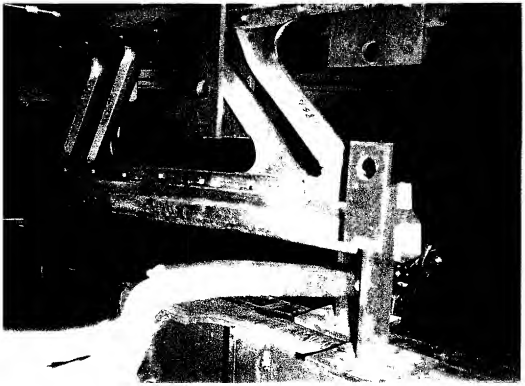


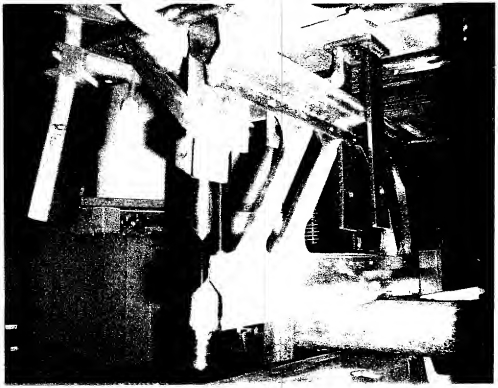


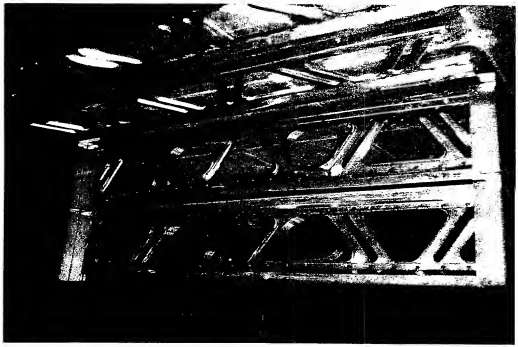


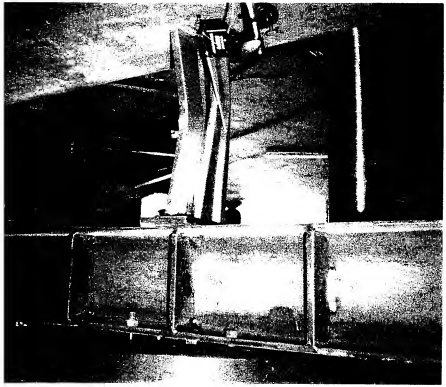


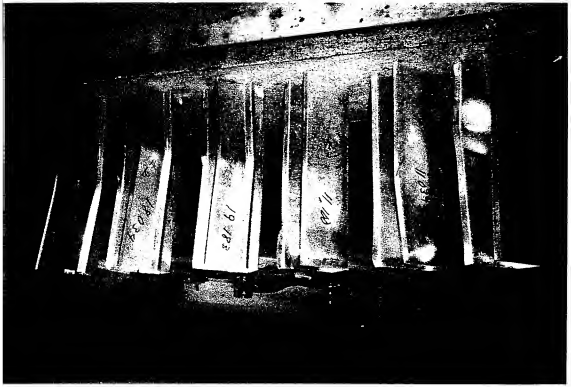












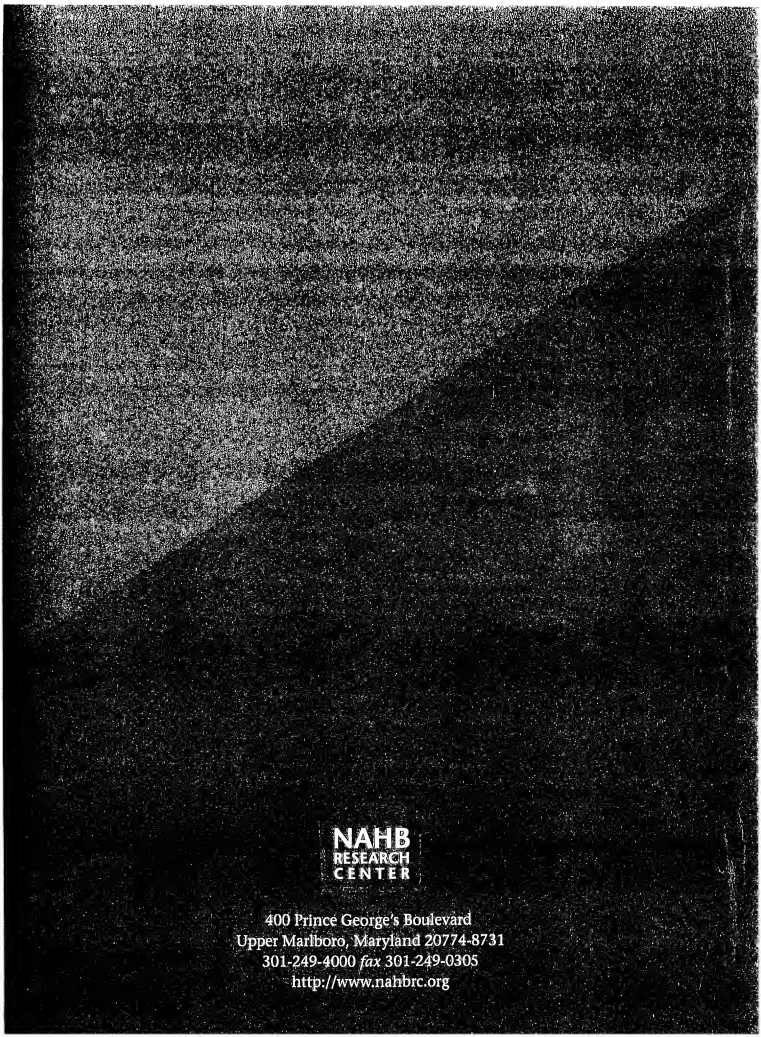


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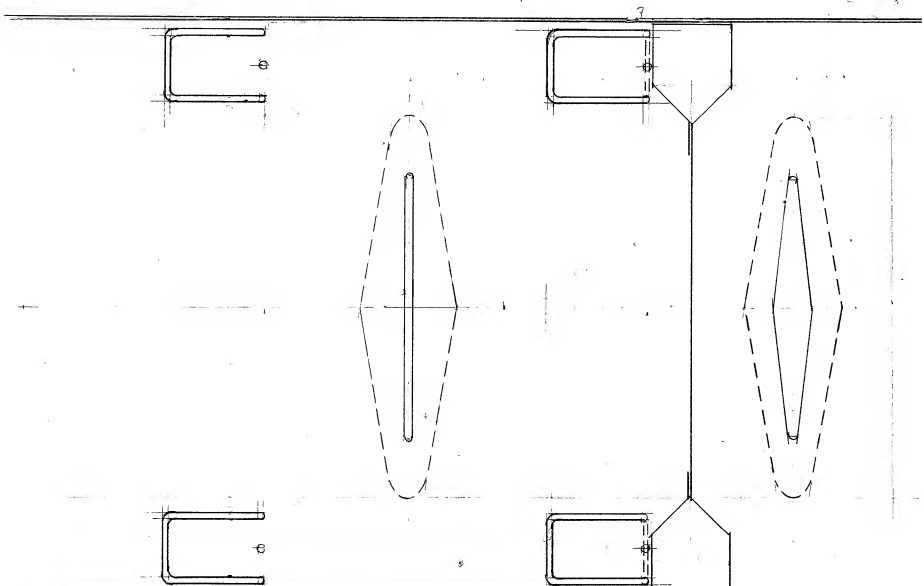
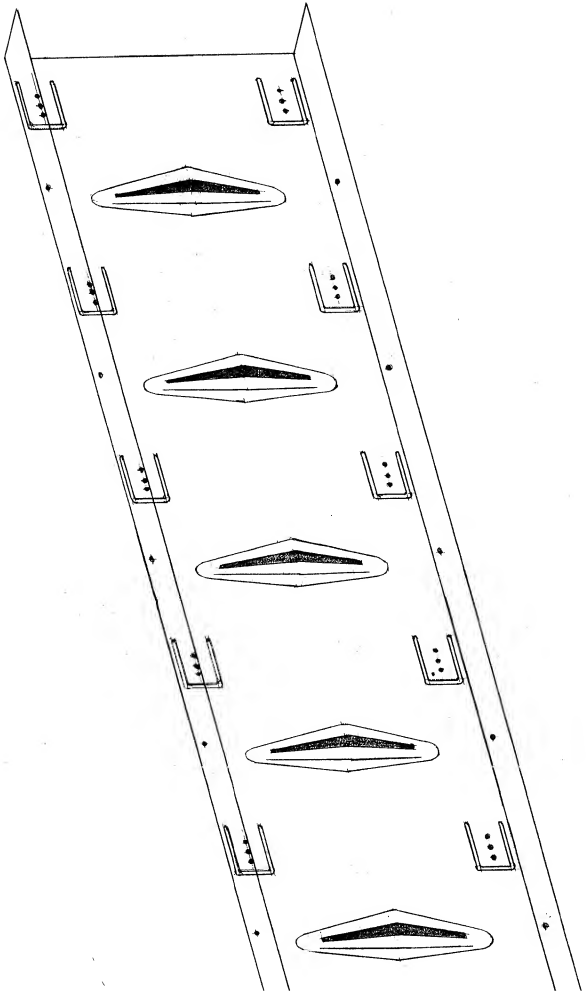
EXHIBIT 42

STEEL I JOIST RIM BAND

OUT LINE



8,0" o/c



BOB FISH TUES 7-30-96

1. OPTION TO PURCHASE RIGHTS - SEPARATE
   a. TRUSS JOIST 75,000 + .04 ¢ ea
   b. ROOF TRUSS CHORD 100,000 .03¢ ea
      GUS TRUSS

2. DO / REMAIN INDEPENDANT / INDIVIDUAL?
   RESIDENCE - "STATE - (NEV OR MAL)

3. R & D CO.
   a. THEY PROVIDE CAPITOL
   b. / RETAIN P. RIGHTS? OWN BY CO?
   c. OPTION TO BUY BACK COMPANY?
   d.

ABSTRACT

BACKGROUND OF THE INVENTION

SUMMARY OF INVENTION

DESCRIPTION OF DRAWINGS

DETAILED DESCRIPTION

DESCRIPTION OF DRAWINGS

2. ~~X~~ END VIEW
FIGURE 1

1. ~~2.~~ ~~SIDE~~ SIDE VIEW

DESCRIBE ANGLES
FLANGES

3. PERSPECTIVE

4. END CAP A PLAN

B WITH FLANGES - BOT

5. RIM JOIST - 12" TRACK

6. ~~FLAT~~ SHEAR - 16" SHEET

3778946

MICR

CLASSIFICATION DEFINITIONS

52-66 ✓ 223.8 BEAM, GIRDER, OR TRUSS CONSTRUCTION: PREFORMED STRUCTURE UNDER SUB-CLASS 223.1 WHICH IS A DISTINCT GENERALLY HORIZONTAL STRUCTURAL MEMBER STRENGTHENED ALONG A MAJOR OR MINOR AXIS TO COUNTERACT FORCES FROM ADDITIONAL LOADS (E.G. FLOOR, ROO

52-66 223.9 COMPOSED OF ABUTTING SECTIONS: BEAM, GIRDER OR TRUSS UNDER SUBCLASS 223 WHICH IS MADE UP OF A PLURALITY OF PREFORMED SECTIONS.

52-65 ✓ 223.12 HOMOGENEOUS DESIGN (E.G. ALL METAL) BEAM, GIRDER OR TRUSS UNDER SUBCLASS 223 IN WHICH THE STRUCTURAL ELEMENT INCLUDING THE PRESTRESSING MEANS IS FABRICATED FRO A SINGLE MATERIAL (E.G. STEEL)

52-126 ✓ 634 STRUCTURE UNDER SUBCLASS 633 IN WHICH THE ELONGATED RIGID STRUCTURE HAS PARTS ACTING AS ELONGATED RUNNERS (CHORDS) AND CROSS MEMBERS (STRUTS) WITH THE STRUTS BEING INTEGRAL WITH A CHORD.

✓ PRINT-OUT OF PATENT NOS.

MLRP
52-145

9.29.1 I BEAM

STRUCTURE UNDER SUBCLAUSE 9.20.1 INCLUDING AT LEAST 2 FLANGE MEMBERS JOINED BY A WEB MEMBER, WHICH PROVIDE A CROSS-SECTION OF THE SHAPE OF AN I OR H

CLASS 52 STATIC STRUCTURES (E.G. BUILDING

CLASSIFICATION DEFINITIO

BEAM, GIRDER OR TRUSS CONSTRUCTION	223.8	
I BEAM	729.1	
~~CORRUGATED WEB~~	~~729.3~~	
~~WOODEN COMPONENT~~	~~740.8~~	
~~FOLDED SHEET MATERIAL~~	~~741.1~~	
* TRUSS WITH UNITARY CHORD & WEB E.G. SHEET METAL	634 *	
* CONTINUOUS SERPENTINE; E.G. WARREN TRUSS	694	

TRUSS WITH UNITARY CHORD & WEB	634	
WEBB PORTIONS CONNECTED BETWEEN CHORDS	636	
BEAM E.G. GIRDER, JOIST, ETC	650.1	
HOMOGENOUS DESIGN (EG ALL METAL)	223.12	YES
BEAM, GIRDER OR TRUSS CONSTRUCTION	223.8	YES

HISTORY

JOIST JOISTBEAM

A JOIST IS A HORIZONTAL STRUCTURAL MEMBER TO SUPPORT A FLOOR OR A ROOF.

CONVENTIONAL WOOD FRAME CONSTRUCTION UTILIZES SOLID SAWN LUMBER, I.E. 2"X8" TO 2"X14" IN SIZE. THESE MEMBERS ARE TYPICALLY AVAILABLE UP TO 20 FT. LENGTHS, ARE HEAVY, ALLOW ONLY MINOR DRILLING FOR ELECTRICAL AND QUALITY IS DIMINISHING DUE LACK OF OLD GROWTH TIMBER

FABRICATED WOOD JOISTS CALLED T.J.I.S (TRUSS JOIST I BEAM) ARE MANUFACTURED UTILIZING SOLID OR LAMINATED TOP & BOTTOM CHORDS AND AN INTERMEDIATE SHEET OF PLYWOOD, GLUED BETWEEN THEM, AS A WEB. THESE ARE AVAILABLE IN LONG LENGTHS, VARIOUS HEIGHTS AND ARE A POPULAR CHOICE. THEY ARE LIMITED IN CERTAIN APPLICATIONS AS THEY MAY NOT BE DRILLED OR NOTCHED NEAR THEIR ENDS

FABRICATED OPEN WEB JOISTS ARE MANUFACTURED UTILIZING SOLID OR LAMINATED TOP AND BOTTOM CHORDS AND EITHER WOOD OR METAL WEBS.

CLASS / SUBCLASS

CLASS 52 STATIC STRUCTURES (E.G. BUILDINGS)

Class : 52/634

DAN DIPY STUDIO

5463837 Metal roof truss
52/639 52/92.2 52/634 52/690 52/731.9

~~4869040~~ FRAMING SYSTEM
52/633 52/634

4793113 Wall system and metal stud therefor
52/481.1 52/634 52/636 52/733.2 D25/119 D25/132

4490958 SHEET METAL BEAM
52/634 52/729.3 52/729.5 52/731.7

~~4385476~~ WEB STIFFENER FOR LIGHT-GAUGE METAL FRAMING MEMBERS
52/739.1 52/634

4329824 SHEET METAL BEAM
52/634 52/729.3 52/731.7 52/737.6

~~4228631~~ HOLLOW RECTANGULAR JOIST
52/690 52/634 52/693 52/730.7

~~4030256~~ BUILDING CONSTRUCTION
52/93.1 52/634 52/643 52/694 D25/61 D25/132

~~3845594~~ STEEL JOIST OR COMPOSITE STEEL AND CONCRETE CONSTRUCTION
52/98 52/334 52/634 52/690 52/729.5

~~3705108~~ ROOF TRUSSES
52/645 52/634 52/640 52/641 52/650.2

SUB-CLASS 634

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NOT RELEVANTE

4,435,948 (ANGELES) 3/1984 DAVENPORT ET AL